

MERTHYR TYDFIL COUNTY BOROUGH COUNCIL LOCAL FLOOD RISK MANAGEMENT STRATEGY



















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1. CABINET MEMBER FOREWORD

Communities, businesses and infrastructure across Merthyr Tydfil suffered the devastating impacts of Storms Dennis and Ciara in 2020 with over two hundred residential and commercial properties, and three main roads flooded. The most severely affected areas were the communities of Troedyrhiw and Pentrebach. A number of smaller surface water flooding incidents have also occurred across the borough in the years since 2020, causing disruption to livelihoods, infrastructure and the economy in Merthyr Tydfil.

In the face of these challenges, I am proud of the resilience shown by communities and how they have united, and worked with the council and other risk management authorities to respond and recover.

In excess of 40 new flood risk management schemes and improvement works to existing assets have been undertaken since Storm Dennis to help protect communities from future flooding, with £8 million invested to date. However, climate change means that we will see an increase in intensity and number of storms in the future which will continue to increase the risk of flooding.

Working in partnership with local people and other Risk Management Authorities will be key to delivering catchment based approaches for flood risk management.

Despite pressure on council budgets, recent flooding events reinforce the need for continued investment in flood prevention, resilience and adaptation. The 2020 storms also highlighted how we should improve our communication of flood risk, how we warn our at risk communities and how we manage our responses to major flooding events.

This Local Strategy provides a more expansive and adaptive approach to managing flood risk compared to

our previous strategy published in 2013. Local Strategies are expected to be updated every 6 years but the new Local Strategy includes a Flood Action Plan which will be updated periodically as a 'live' document to help us deliver against our objectives.

The strategy places greater emphasis on improving our understanding of flood risk in order to inform prevention and preparedness. In addition to more traditional flood resistance approaches and robust maintenance regimes, we will champion a greater use of natural flood risk management techniques. These techniques will allow us to adapt more effectively to climate change whilst providing healthy and attractive environments, helping our communities to thrive.



Councillor David Hughes Portfolio Member for Neighbourhood Services

2. INTRODUCTION

2.1 THE NEED FOR A LOCAL STRATEGY

The Flood and Water Management Act 2010 requires all 22 Lead Local Flood Authorities (LLFAs) in Wales to produce a Local Flood Risk Management Strategies (Local Strategy).

The Welsh Government's National Strategy for Flood and Coastal Erosion Risk Management (FCERM) in Wales (National Strategy) sets out that over 245,000 properties across Wales are at risk of flooding from rivers, the sea and surface water, with almost 400 properties also at risk from coastal erosion. The National Strategy explains that, as the climate changes, we can expect those risks to increase, with more frequent and severe floods, rising sea levels and faster rates of erosion of the coast.

The National Strategy sets out the legislative context to FCERM activities in Wales. In certain cases, Local Authorities were also required to produce Flood Risk Management Plans (FRMP), under the 2009 Flood Risk Regulations. A summary of the legislative context to FCERM activities in Wales is provided in Section 3 – legislative context.

Different Risk Management Authorities (RMAs) in Wales are responsible for different sources of flood risk. LLFAs are responsible for "local flood risk" which is defined as flood risk from:

- Surface water runoff
- Groundwater; and
- Ordinary watercourses (generally smaller watercourses)

This Local Strategy focuses on these local sources of flood risk, but acknowledges and considers other sources of flood risk (including the sea, larger watercourses and sewers) and associated RMAs.

The Merthyr borough has been subject to a number of widespread flooding events in the past fifty years namely in 1979, 1999 and 2009 where many properties across the borough were subject to internal flooding, either from the river, surface water or ground water. It is currently estimated that in excess of 2500 properties are at high risk of flooding from surface water flooding across the borough

The severe storms of 2020 and subsequent flooding of over two hundred properties, has taught us that we must not be complacent in respect to flooding and unless we invest and take action now, the next major flooding is likely to be even more catastrophic and a greater number of residents in the borough will suffer as a result. This strategy sets out how the Council intends to implement changes in perception to flood risk, detail where we will invest funding and how we intend to change mind sets from reactive flood risk management to a more proactive based attitude.

2.2 THE PURPOSE OF THIS LOCAL STRATEGY

We published our first Local Strategy in 2013, setting out our overarching approach to managing local flood risk. Alongside our Local Strategy, we published a FRMP. Our FRMP developed the objectives and high-level actions outlined in our Local Strategy into a more detailed plan for managing flooding in our communities.

This document is our second Local Strategy. Whilst we previously published our Local Strategy and FRMP separately, this new Local Strategy integrates the two documents into one. This reduces complexity and enables us to communicate and manage local flood risk more effectively. In this document we explain how flooding will be managed across our Local Authority area, consistent with the objectives, measures and related policies and legislation set out in the National Strategy. This Strategy and Action Plan is to be reviewed by Welsh Government and published in April

2024. The Action Plan will be an evolving document which will be reviewed and updated annually. The Strategy document itself, will be renewed every six years, in line with Welsh Governments National Flood Risk Management Strategy.

2.3 STRUCTURE OF THIS LOCAL STRATEGY

Chapter 3 gives an overview of climate change flood risk in our area and how this Local Strategy seeks to address these risks.

Chapter 4 summarises how this Local Strategy aligns with our other strategic plans, for example our Local Development Plan and Shoreline Management Plan(s). It also summarises how we have developed the Local Strategy in coordination with other stakeholder plans, such as NRW's River Basin Management Plans (RBMPs) and DCWW's forthcoming Drainage and Wastewater Management Plan (DWMP).

Chapter 5 sets out the roles and responsibilities for managing flood risk in our area. It also highlights some of the key policies we have in place for managing local flood risk.

Chapter 6 describes our strategic Objectives or ambitions for managing flood risk in the coming years, and how these align with the objectives set out in the National Strategy.

Chapter 7 presents an assessment of the risk of flooding across our Local Authority.

Chapter 8 summarises the different ways in which flood risk management activities can be funded, as well as how we prioritise these activities.

Chapter 9 sets out our flood risk management Measures. These are broad activities and ways of working which help us to meet our strategic objectives.

Chapter 10 sets out our flood risk management Action Plan. This is a focused plan, detailing specific actions required to meet our measures.

Chapter 11 describes how we will measure and monitor our progress in delivering the objectives, measures and actions set out in this Local Strategy.

2.4 TARGETS WITHIN THIS LOCAL STRATEGY – OBJECTIVES, MEASURES AND ACTIONS

This Local Strategy sets out our flood risk management Objectives, Measures and Actions. These three groupings provide different levels of detail on how flood risk will be managed. The meaning of each is summarised in the following diagram:



Figure 1 Objectives, Measures and Actions



3. LEGISLATIVE CONTEXT

FLOOD RISK REGULATIONS 2009

The Flood Risk Regulations 2009 were revoked under the Retained EU Law (Revocation and Reform) Act 2023 on 31st December 2023. Due to their prominence in flood risk management legislation up to and including when this Strategy was drafted, they are described here and referenced within this document.

The Flood Risk Regulations 2009 implemented the EU Flood Directive in England. They provided a framework for managing flood risk over a 6 year cycle, and required:

- production of a Preliminary Flood Risk Assessment (PFRA)
- identification of potential significant risk, referred to as flood risk areas (FRAs)
- mapping of flood hazard and risk
- Flood Risk Management Plans, setting out measures and actions to reduce the risk.

The Regulations required that each of the four elements identified above be reviewed and updated where necessary, at least every six years. MTCBC completed its PFRA in 2011 to support the production and publication of it flood risk management plan in 2015. Due to the revocation of these regulations, the relevant elements of FRMPs have been incorporated into this LFRMS.

FLOOD AND WATER MANAGEMENT ACT 2010

Sir Michael Pitt was asked by government to conduct a thorough and independent review of the flooding emergency that took place in June and July 2007 with recommendations as to what might be done differently. The current arrangements for flood risk management set out in the Flood and Water Management Act 2010 were significantly shaped by the Pitt Review.

The Flood and Water Management Act 2010 (FWMA) aims to help improve flood risk management and ensure the security of water supplies in England and Wales. The Act updates legislation to ensure better protection from flooding, manage water more sustainably, improve public services and secure water resources during periods of drought.

The FWMA creates clearer structures and responsibilities for managing flood and coastal erosion risk. It improves local leadership by imparting a role on local authorities. Local authorities are classed as Lead Local Flood Authorities (LLFAs) who have responsibilities for managing local flood risk, while Natural Resources Wales are responsible for managing flood risk from main rivers and the sea.

LAND DRAINAGE ACT 1991

The Land Drainage Act 1991 is UK legislation that consolidates existing laws regarding land drainage and sets out the rights and responsibilities in relation to land drainage. The Act makes provision for the powers of Internal Drainage Boards in control of internal drainage districts. The Council's role as enforcer is not to provide a remedy to private land drainage issues, but to use statutory powers to identify a cause, specify a remedy and require the respective land owner or occupier to implement the remedy by formal means if necessary.

WATER FRAMEWORK DIRECTIVE 2000

The Water Framework Directive (WFD) is a European Union directive that aims to ensure good qualitative and quantitative health of water bodies in Europe by reducing and removing pollution and ensuring that there is enough water to support wildlife at the same time as human needs. It has been the main law for water protection in Europe since 2000 and applies to inland, transitional, and coastal surface waters as well as ground waters. The WFD sets out objectives, standards, criteria, and tools to ensure good status for water quality and quantity and requires Member States to cooperate on river basin management plans and programs of measures.

ENVIRONMENT ACT 2016

The Environment Act 2016 is an Act of the National Assembly for Wales. It promotes sustainable management of natural resources, provides for targets for reducing emissions of greenhouse gases, and reforms the law on charges for carrier bags. The act also provides for the separate collection of waste, prohibits disposal of food waste to sewers, and provides for prohibiting or regulating disposal of waste by incineration. It establishes the Flood and Coastal Erosion Committee and makes minor changes to the law about land drainage and byelaws made by the Natural Resources Body for Wales.

WELL BEING OF FUTURE GENERATIONS ACT (WALES) 2015

The Well-being of Future Generations (Wales) Act 2015 is a law that requires public bodies to work for the long-term well-being of Wales, covering social, economic, environmental, and cultural aspects. It sets out 7 well-being goals that include a prosperous, resilient, healthy, and globally responsible Wales, as well as a Wales of cohesive communities, vibrant culture, and thriving Welsh language. The act places a duty on public bodies to carry out sustainable development, which includes setting and publishing objectives that are designed to maximize their contribution to achieving each of the well-being goals. The act also establishes a Future Generations Commissioner for Wales to advise and assist public bodies in doing things in accordance with this act. Public services boards in local authority areas are also established to plan and take action in pursuit of economic, social, environmental, and cultural well-being in their area

PLANNING (WALES) ACT 2015

The Planning (Wales) Act 2015 is a legislation passed by the National Assembly for Wales. It aims to provide a framework for national, strategic, and local development planning in Wales. The act also makes provisions for certain applications for planning permission and other applications to be made to the Welsh Ministers. It also makes provisions about development management and applications for planning permission, planning enforcement, appeals, and other proceedings. The act also amends the Commons Act 2006 and is intended to be carried out as part of sustainable development in accordance with the requirements of the Well-being of Future Generations (Wales) Act 2015.

CIVIL CONTINGENCIES ACT 2004

The Civil Contingencies Act 2004 is a UK law that provides a framework for civil protection in the United Kingdom. The act requires local authorities and NHS bodies to prepare for potentially life-changing events and incidents. It also allows the UK government to make last-minute, short-term, and drastic legislative changes on an unprecedented scale in case of an emergency.

THE WATER INDUSTRY ACT

The Water Industry Act 1991 is a UK law that sets out the main powers and duties of the water and sewerage companies. The act replaced the Water Act 1989 and defined the powers of the Director General of Water Services, now the Water Services Regulation Authority (Ofwat). The act provides new entitlements for water consumers, particularly household customers in England and Wales. It prohibits the disconnection of the water supply to homes for reasons of non-payment and gives many water consumers new rights to choose the basis on which they are charged for water and sewerage services.

4. HOW THIS STRATEGY RESPONDS TO CLIMATE CHANGE

4.1 CLIMATE CHANGE RISK IN OUR AREA

The Senedd was the first Parliament in the world to declare a climate emergency. Climate change is likely to increase the risk of flooding, not only in our borough but across Wales and the globe. Floods are made more likely by the more extreme weather patterns caused by long-term global climate change. Our global temperature on the 1st of January 2023 was the highest ever recorded. The average global temperature is 1.1°C higher than the beginning of the last century. Higher global temperatures give the earth's systems greater energy and with higher sea levels and a warmer climate, will result in greater evaporation, more moisture content in the air leading to increased precipitation intensity, duration and/or frequency.

Change in land cover (e.g. urbanisation), an ageing drainage/flood defence infrastructure and climate change all increase flood risk. Extreme floods can be triggered by intense precipitation, longer duration, close repetition of precipitations or a combination of these. In the case of close and intense precipitations there is high confidence that this is an increasing trend, especially in relation to winter flooding.

MTCBC has experienced some of the effects of this trend over the past decade. Notably early in 2020, two consecutive storms in close repetition occurred – storms Ciara and Dennis. Both storms occurred within a week of each other, leading to swollen watercourses, saturated ground conditions and high ground water tables. The combination of these factors resulted in high levels of run off leading to a drainage infrastructure unable to cope with the demand and subsequently caused widespread flooding. On record, some 232 properties suffered from internal flooding as a result of these 2 storms – the worst account of flooding on record. Whilst these events can't necessarily be apportioned to the effects of climate change, there is evidence to suggest that as global temperatures rise, the frequency of these types of prolonged, intense storm events will increase and will become the norm.

4.2 HOW OUR STRATEGY ADDRESSES THESE RISKS

Section 8(2)(i) of the Flood and Water Management Act 2010 requires the LLFA to consider the current and predicted impact of climate change on flood and coastal erosion risk management.

MTCBC considers the impacts of climate change on flood and coastal erosion risk management activities in many ways and many of the objectives and actions set out within this strategy seek to address the risks that climate change poses.

Through our tailored measures and action plan, MTCBC will endeavour to break down the familiar internal silos and work with other departments in addressing the long term risks associated climate change and in adapting working practices to ensure relevant targets are met.

This could be working with our planning colleagues and influencing decisions relating to potential development sites. Working with our property and building asset teams, ensuring flood risk and climate change adaption is considered for potential sites the authority may look to utilise for carbon net zero projects.

5. CO-ORDINATION

5.1 HOW THIS STRATEGY ALIGNS WITH OUR OTHER STRATEGIC PLANS

In order to achieve a holistic approach to flood risk management, it is essential that MTCBC's Local Flood Risk Management Strategy considers key plans and strategies developed by internal and external partners. Details of other internal plans and strategies are as follows:

• MCTCBC's Corporate Well Being Plan 2023¹

This plan sets out the Local Authorities intention for making the borough a better place to live and work over the next five years. The plan has four overarching objectives:

- An Aspirational Merthyr Tydfil, focused on learning
- A Healthier Merthyr Tydfil
- A Safe and Prosperous Merthyr Tydfil
- A Clean and Green Merthyr Tydfil

MTCBC's LFRMS seeks to contribute to these objectives by including its own objectives which aim to ensure the highest risk communities are well informed, feel safe and can live in an area which benefits from an increased natural environment with increased biodiversity whilst receiving increased protection from flooding.

• MTCBC's Replacement Local Development Plan (LDP) 2016 – 2031²

This plan is a piece of planning policy that sets out key development initiatives up until 2031.

Flood risk from all sources should be considered for all potential development sites as well minimising the impact on downstream receptors by introducing sustainable drainage in accordance with Schedule 3 of the Flood and Water Management Act 2010³

• MTCBC's Nature Recovery Plan 2019 – 2024⁴

This plan seeks to maintain and enhance the diversity of our natural environment to make it resilient and able to support the social, economic, health and well-being of local communities, both for enjoyment and for its own inherent value. The LFRMS contributes to this plan by ensuring all new development enhances biodiversity with the introduction of well-designed sustainable drainage systems and ensuring any planned works have a positive impact on the natural environment. Biodiversity and the effects of flooding are considered within the strategy's objectives.

MTCBC's Decarbonisation Plan 2023 – 2030⁵

The plan outlines Merthyr Tydfil County Borough Council's Decarbonisation Plan, which will be used to help inform the authority's transition to becoming a carbon neutral public sector organisation by 2030. A key theme of the plan is improving management of council owned land by introducing green corridors and utilising natural flood management techniques which are considered within the LFRMS objectives.

MTCBC's Emergency Response Plan⁶

This plan details how the authority and all responsible internal partners inform, plan and react before, during and after flooding events. The LFRMS includes objectives detailed in section 9 on how we intend to maintain and improve this process to ensure all residents are adequately informed and educated about the risks whilst giving them the right support should a flooding incident occur.

• MTCBC's Corporate Asset Management Plan (AMP) 2023-2038⁷

The plan outlines how MTCBC will deliver their vision of a property portfolio that is aligned to corporate priorities and service requirements. Key themes in the plan include the management of green infrastructure, open spaces and biodiversity, Schools, and large scale schemes such as Merthyr Town Centre Regeneration and the Hoovers site. The LFRMS will support this strategy by ensuring flood risk to council assets is minimised and innovative green solutions that support biodiversity are used wherever possible.

5.2 COORDINATION WITH OTHERS

• National Flood Risk Management Strategy⁸

This strategy is a requirement under the terms of the Flood and Water Management Act 2010 and provides framework for how flood risk is to be managed in partnership with RMA's at a national level. Our overarching objectives are underpinned by the objectives set out in the National Strategy which is detailed further in chapter 7.

• National Flood Risk Management Plan⁹

The Flood Risk Regulations 2009 placed a statutory duty on NRW to produce a National Flood Risk Management Plan for flood risk at a river basin district level and coastal erosion in Wales. MTCBC continues to engage with NRW and develop partnership working in order to progress the objectives and measures set out in their plan.

DCWW Wastewater Management Plan¹⁰

This is a plan developed by Dwr Cymru/Welsh Water and is a long-term planning study which looks at drainage and sewerage needs over the next 25 years. The Plan looks at future trends and embeds an approach of working together with others to investigate and identify options for the sustainable management of wastewater services. Measures in our plan look to develop sustainable surface water management that reduces the impact on the sewerage network.

• DCWW Surface Water Removal Schemes

MTCBC is working closely with DCWW in progressing critical schemes which seek to remove surface water from the sewerage networks thus, reducing the impact on the existing capacity of these systems and in turn improving the water quality of receiving water bodies.

• Taff Catchment Strategic Flood Management Plan

The continued development of the Taff Catchment Strategic Flood Management Plan in response to the February 2020 floods. NRW continue to carry out detailed flood risk modelling to support the next phase of work planned to develop the plan. This work is being done in collaboration with MTCBC, RCTCBC, CCBC and DCWW.

Merthyr Catchment Management Plan

MTCBC and other interested external stakeholders have been working with NRW in the early stages of trial catchment partnership for the Merthyr catchment where we have looked at opportunities within the borough to reduce flood risk, reverse the decline in bio-diversity, support climate change adaptation through ecosystem approaches and improving the quality of our water bodies.

5.3 PUBLIC CONSULTATION

Two rounds of public consultation were undertaken to inform the Local Strategy.

An initial informal online survey was undertaken in August 2023 to inform the development of the Local Strategy and provide a baseline of the public's understanding of flood risk in Merthyr.

Formal consultation on the draft Strategy and draft SEA was undertaken over 10 weeks from late November 2023. The consultation was carried out using an online questionnaire which was also made available in printed format. All relevant RMAs were sent the survey directly, and the public were targeted using several advertising formats. These included social media, staff emails, and posters.

Responses were received from RMAs and 41 members of public, and many updates were made to the Strategy based on this feedback. Appendix B provides details of the responses, and the changes made as a result.

Following updates based on the consultation feedback, the Local Strategy was submitted to MTCBC Cabinet and approved in April 2024.



6. ROLES AND RESPONSIBILITIES FOR MANAGING FLOOD RISK

6.1 SOURCES OF FLOODING AND KEY POINTS OF CONTACT

Flooding occurs from many different sources and different organisations have responsibilities for managing the risk from the varying sources. There is often an assumption that the Local Authority leads on all aspects of flooding but this isn't always the case. Figure 2 has been taken from the National Strategy and it summarises the different types of flooding and the responsible organisations in each case.



Figure 2 Who to Contact

6.2 RISK MANAGEMENT AUTHORITIES AND THEIR FUNCTIONS

Risk Management Authorities (RMA) across Wales include Natural Resources Wales (NRW), the 22 Local Authorities and Water Companies. Each RMA is required to fulfil a number of statutory duties as defined by the Flood and Water Management Act 2010. In addition to these statutory duties, the act sets out a range of permissive powers for RMA's enabling them undertake defined activities if they wish. Table 1 details sources of flooding and the RMA's responsible for its management.

Dŵr Cymru Welsh Water	Regulatory body, responsible for management of flooding from sewerage networks
Cyfoeth Naturiol Cymru Natural Resources Wales	Regulatory body responsible for management of flooding from main rivers and reservoirs in Wales
Cyngor Bwdeistref Sirol MERTHYR TUDFUL MERTHYR TYDFIL County Borough Council	Regulatory body responsible for management of flooding from ordinary watercourses, surface water, groundwater, and flooding associated with non-trunk roads in the Merthyr Borough.
Llywodraeth Cymru Welsh Government	Regulatory body responsible for management of flooding associated with trunk roads in Wales
Mining Remediation Authority	Regulatory body responsible for management of flooding from past mining activity

Table 1 - RMA's and their responsibilities

Lead Local Flood Authority (MTCBC)

Merthyr Tydfil County Borough Council is designated under the Flood and Water Management Act 2010, as a Lead Local Flood Authority. Its function is to act as a regulatory body responsible for overseeing the management of flood risk from ordinary watercourses, surface water and groundwater.

The act places a number of statutory duties on the MTCBC as listed below.

- Developing, maintaining and applying a local flood risk management strategy.
- Maintaining a register of structures or features that have a significant effect on local flood risk.
- Investigating and reporting on significant local flooding incidents to identify the causes, consequences and
 possible actions to reduce the risk of future flooding.
- Establishing and maintaining a partnership with other RMA's; sharing data.
- Regulating and consenting activities that could affect the flow of water in ordinary watercourses.
- Contribute towards sustainable development.
- Act as the SuDS approval body responsible for the technical approval of sustainable drainage systems serving new developments with drainage implications.

Natural Resources Wales

Under the Flood and Water Management Act 2010, Natural Resources Wales are designated as the regulatory body responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea. NRW are responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion.

Under the act they have statutory duties as listed below.

- Co-operating with other Risk Management Authorities including sharing data.
- Reporting to the Environment Minister on flood and coastal erosion risk in Wales.
- Development of the National Flood Risk strategy in Wales.
- Establishment of a Regional Flood and Coastal Committee for each region that is wholly or mainly in Wales

• Consult with that committee on how it proposes to carry out its flood risk management functions.

Under the Flood Risk Regulations 2009, NRW also have the following duties.

- Preparation of preliminary assessment maps and reports
- Identification of flood risk areas
- Preparation of flood hazard maps and flood risk maps
- Preparation of flood risk management plans

Dŵr Cymru/ Welsh Water

Water companies, when exercising their flood or coastal erosion risk management functions in relation to an area within Wales, must have regard to the relevant Local Strategies and any associated guidance

Water and sewerage companies are responsible not only for the provision of water, but also for making appropriate arrangements for the drainage of foul water, the treatment of waste, surface water sewers and combined sewers. They have primary responsibility for floods from water and sewerage systems, which can include sewer flooding, burst pipes or water mains or floods causes by system failures.

No changes have been made to the operational arrangements for water and sewerage companies in respect of flood risk.

The Flood and Water Management Act 2010 places a number of statutory duties on Water and sewerage companies including:

- A duty to act consistently with the National Strategy
- A duty to have regard to the content of the relevant Local Strategy
- Co-operation with other Authorities, including sharing data.

Water and sewerage companies often hold valuable information which could greatly aid the understanding of flood risks faced by communities across Wales. Water and sewerage companies will also need to contribute to the preparation of the Local Strategies prepared by LLFAs.

Welsh Government

The Welsh Assembly Government act as the Highway Authority for all arterial trunk roads in Wales. SWTRA (South Wales Trunk Road Agency) are an agent working on behalf of Welsh Government who manage flood risk from all sources associated to trunk roads. This can be management of surface water affecting the highway or culverted watercourses and any structures that support the highway infrastructure.

Welsh Government are the authorship of the National Flood Risk Strategy and also manage the flood risk management grant funding streams as listed below.

- FCERM Capital scheme grant funding
- FCERM Small Scale scheme grant funding
- FCERM Revenue grant funding

Mining Remediation Authority

The Mining Remediation Authority (MRA), formerly the Coal Authority, is a risk management authority responsible for managing the effects of past coal mining including subsidence, flooding, water pollution and other mining legacy issues. The Flood and Water Management Act 2010 does not explicitly mention the MRA, but their remit and collaboration with the LLFA is becoming increasingly important in managing flood risk in Merthyr County Borough.

There is an extremely high density of old coal mine workings across the borough with the potential to have major impacts on flood risk.

6.3 OTHER RESPONSIBLE PARTNERS

Riparian landowners

If a land owner has an ordinary watercourse or main river routed through their land, they are a riparian land owner². Generally, riparian landowners are responsible up to the centreline of the watercourse and have a duty to ensure it is free flowing and doesn't increase the risk of flooding to adjacent landowners. Riparian landowners are also responsible for maintenance of embankments, vegetation lining the watercourse and any culvert inlet/outlet structures serving the watercourse within their boundary. Where a watercourse is culverted across a section of land, the landowner is also riparian and responsible for its maintenance and ensuring it is kept free of obstructions. Should riparian owners wish to carry out works on a watercourse, approval must be sought from the LLFA. Full details of riparian rights and responsibilities can be found on the Natural Resources Wales website¹¹

Transport for Wales

Transport for Wales (TfW) have two operational lines within the Merthyr Borough – The Valley Line and the Cwm Bargoed mineral line. TfW are responsible for managing flood risk relating to numerous ordinary watercourses and culverts networks within land under their ownership.

Property and Business owners

Property and business owners have a responsibility to manage flood risk associated with their own properties. Property owners have the right to defend their own properties from flooding as long as they don't increase the risk of flooding to neighbouring properties by doing so. Further information and advice for those at risk of flooding is available on NRW's website ¹²

Property owners at high risk of flooding should ensure their properties are adequately resilient to help protect themselves from future flooding and to consider methods of protection. Further information on measures available can be found at the Blue Pages¹³ website.

Other Partners

MTCBC Partners	External Partners	
Planning Development Control	Fire Service	
Planning Policy	South Wales Police	
Planning Enforcement	South Wales Ambulance Service	
Ecology	Merthyr Valley Homes	
Building Control	Merthyr Housing Association	
Emergency Planning	Wales and West Housing Association	
Environmental Health	National Flood Forum	
Highway Maintenance	National Farmers Union	
Property Services	Estate Owners	
Parks and Leisure	CADW	
ICT	House Builders Federation	
Street Scene	CADW	
Estates	Bannau Brycheiniog National Park	

Table 2 - Other Partners

6.4 HOW WE MANAGE FLOODING IN OUR AREA

Projects

Small scale flood risk projects

MTCBC uses a combination of revenue and capital funding throughout the financial year to implement various small scale flood risk projects in areas prone to surface water flooding. These minor works are critical in protecting our communities from minor flooding incidents and the funding MTCBC receives in order to identify, survey and implement these types of small projects is vital to ensure we continue to protect our communities. The following pages are examples of some of the work being undertaken to protect our communities from the effect of flooding.

Castle Park land drain and bund (Clwydyfagwyr): Residents at Castle Park area had experienced internal flooding due to a poorly functioning land drain which regularly overtopped affecting three adjacent properties. MTCBC appointed a contractor and worked with the land owner to replace the existing land drain and construct a flood bund offering protection to the properties during periods of prolonged rainfall.



Figure 3 Castle Park flood alleviation

Pandy Cottages culvert rehabilitation (Trelewis): MTCBC received a report of sinkhole in close proximity to an ageing 1.5m diameter ARMCO culvert. Our investigation concluded that severe scour at the culvert invert was causing surrounding material to wash out during high flows leading to a large sink hole to the side of the culvert. Watercourse modelling estimations concluded that a 1.2 m diameter culvert would be adequate to manage flows up to and including a 1in100 +30%CC rainfall event. A culvert insertion with concrete surround scheme was seen as the most cost effective engineering option to secure the culvert and protect neighbouring properties.





Storm Dennis flood risk projects

In the wake of storm Dennis, numerous flooding issues were identified across the borough. Whilst many of the issues couldn't have been pre-empted, in the three years since the event, over fifty flood risk, land slip and structural projects have been undertaken to improve infrastructure and protect our communities.

Plymouth feeder flood defence (Troedyrhiw): Troedyrhiw saw widespread flooding during storm Dennis. The Plymouth feeder, a remnant from the extensive iron works in the area, breached a flood bund and flooded more than 120 properties. A 2.5m flood defence wall and new footbridge to new top of wall levels were constructed to protect the village from future flooding up to and including a 1in200 year storm event.



Figure 5 Plymouth Feeder flood defence

Embankment rehabilitation and soil nailing (Pontsarn): Excessive ground water flooding caused a land slip onto a road restricting access for residents of Pontsarn and Pontsticill during the intense storm Dennis rainfall. A ground rehabilitation and soil nailing project is currently underway to secure the embankment to ensure safe passage for these communities and ensuring the delivery of critical chemical supplies to Pontisticill water treatment works.



Figure 6 Pontsarn embankment stabilisation

Channel and Inlet structure improvement works (Bedlinog): The Maes y Bedw watercourse experiences high flow rates during the winter months and culvert inlet was continually susceptible to blockage due to severe scour of the poorly maintained watercourse under riparian ownership. The Storm Dennis event saw overtopping of the existing headwall structure and flooding of nearby properties and infrastructure. The scheme saw the construction of a rock armoured channel to remove the scour problem and an upgrade to the inlet structure to increase capacity.



Figure 7 Maes y Bedw flood defence

Channel lining and inlet improvement works (Troedyrhiw): The hillside and historic mining activity above Fernhill close, Troedyrhiw gave way to excessive ground water emanating from old mine workings leading to inundation of the existing watercourse and flooding of properties within the adjacent housing estate. The watercourse was lined with 450m of concrete canvas to increase capacity and improvement works to the culvert inlet structure at Rock Gardens were undertaken to reduce the flood risk to nearby residents.



Figure 8 Rock Gardens channel improvements

Tips projects

Post storm Dennis, MTCBC have received ring fenced funding from Welsh Government to develop projects to improve the stability and associated drainage of the numerous category C (high risk) tips across the borough. Whilst the schemes have been designed to improve tip stability, the required drainage works have also been designed to reduce flood risk to the surrounding community.

Tip scour protection and channel improvement works (Swansea Road): Clwdyfagwr tip was identified by the Coal Authority as having severe scour on the eastern flank due to ineffective drainage at the perimeter. The watercourse also presented flooding problems to the adjacent properties. Channel improvement works using concrete canvas blockstone scour protection to the tip were constructed to protect the tip and reduce the flood risk to surrounding areas.



Figure 9 Swansea Road channel improvements

Resilient Roads – Highway drainage schemes

MTCBC have received Welsh Government funding over the past four years in order to improve the sustainability of our adopted highway drainage network, reduce surface water build and improve the safety Council owned highway network.

Drainage replacement works (Gurnos): Residents of Palm Road, Gurnos were continually being affected by surface water flooding after periods of heavy rain. Camera surveys of the existing drainage network concluded failed pipework reducing the ability to drain efficiently, leading to flooding of the area. Pipes and gullies have been upgraded significantly reducing the flooding to adjacent properties.



Figure 10 Palm Road flood protection

Maintenance of flood assets

There are 480 known culvert inlet structures within the borough that require maintenance to ensure flood risk is reduced during inclement weather. 230 of these assets are maintainable by the Local Authority who are generally responsible for the maintenance of flood assets within land under its ownership. The Local Authority, implement a rigorous maintenance schedule in order to ensure that any damage to its assets promptly repaired and a dedicated team of operatives ensure inlet structures are free from debris and water is free flowing. 250 flood assets within the borough are the responsibility of riparian owners. Riparian owners can either be organisations responsible for the land that the flood assets serve such as SWTRA and DCWW or the assets are within private land and the responsibility of individual property owners or farmers. The maintenance of these assets is the responsibility of organisation or land owner and they must ensure that watercourses and culvert inlets are free from obstruction to reduce flood risk. The Local Authority, acting as a LLFA, have legislative powers to enforce the maintenance of flood assets to ensure flood risk to neighbouring properties is at a minimum.

Inspections and surveys of flood assets

MTCBC regularly carries out routine structural inspections on its high risk flood assets. Flood assets can include culvert inlet structures, flood walls, watercourses and bridges. Inspections of structures are critical in certifying their structural integrity and safeguarding against catastrophic failure and ensuring there are no scour issues and potential blockages are identified. Generally, the types of inspections conducted are as follows:

• Culvert inlet structure inspections

The inlet structures of larger diameter culverts are visually inspected to check for structural integrity, scour to headwalls and trash screen damage.

• Routine visual inspections

Scheduled culvert inspections where an operational team visit the highest risk culvert inlets to ensure there are no blockages and are cleaned where necessary.

• CCTV inspections

CCTV surveys are conducted to assess the pipe structure integrity of smaller diameter culverts and highway drains. Surveys can locate distances of pipe failures which allows for accurately determining required repair locations.

Internal culvert inspections

This type of inspection requires manned entry of larger diameter culverted watercourses. A level 3 confined space trained operational team enters the culverted system to inspect for structural integrity and any scour issues. Potential issues are recorded at measured distances and necessary defects scheduled for repair.

Investigations

Investigations post flooding event are a critical in determining the causes of flooding. Regardless of the scale of flooding MTCBC will work collaboratively with other departments and other RMA's in order to establish the root causes and identify necessary works required to resolve any flooding issues. Under Section 19 (S19) of the Flood and Water Management Act 2010, LLFAs have a duty to investigate flooding incidents that result in the internal flooding of twenty or more properties and make the findings of that investigation publically available. Only on one occasion has MTCBC had to conduct such an investigation. One of our actions detailed in section 11 of this strategy, will see the investigation and recording of all flooding incidents to ensure a robust catalogue of flooding occurrences across the borough is captured to help better our understanding of where trends exist and where to prioritise investment to help protect our communities.

Modelling and surveys

Within our borough, there are many historic flood assets which will not have been designed to current standards. Using survey data for culverts and watercourses, MTCBC can carry out hydraulic modelling of known high risk culverts and watercourses to ensure drainage assets are fit for purpose and have the capacity to cater for necessary design requirements including climate change adaption. An example of work currently being undertaken is the flood modelling work being undertaken alongside consultants on the Morlais Brook which is currently placing 240 businesses and residential properties in the town centre at risk of flooding for a 1in100 +30% climate change year storm event. The project, led by MTCBC and funded by Welsh Government, sees a survey of the Morlais Brook catchment, modelling of watercourses and culverts to determine options for a significant reduction in flood risk in the town centre.

Communication

MTCBC currently have 23 flood monitoring stations at some its highest risk culvert inlet structures. The monitoring stations allow us to check rising water levels remotely and dispatch operational teams to clear blockages to ensure water is running freely. Whilst MTCBC does not use this as a method of communicating to communities of impending flood risk currently, we are investigating monitoring systems that could potentially give us real time updates which would allow us to warn communities. This will be taken forward in MTCBC's Action Plan.

MTCBC Engineering department have engaged with local schools and delivered presentations on the risks of flooding and preventative measures. We believe that engaging young people to understand the risk of flooding and what to do if you are at risk is an effective method of getting the message in to our communities.

MTCBC utilise its social media platforms and corporate website to inform our communities of severe weather warnings and where to find advice on the flood risks, preparing for flooding and what to do if affected by flooding.

Coordination

MTCBC are committed to work with various RMAs, external and internal partners in strategically assessing and planning flood risk management as well as reacting to flood risk issues. There are a number of initiatives which MTCBC are currently key development stakeholders.

- DCWW surface water separation schemes MTCBC work closely with DCWW and their consultants in developing and informing their surface water separation initiative. The projects aim is to remove surface water from their combined sewer network to reduce the impact on over active CSOs to reduce their activity levels. The schemes aim to incorporate sustainable drainage to manage surface water, reduce flooding to receiving water bodies and improve water quality.
- Merthyr Catchment Partnership MTCBC are actively working with project lead, NRW and internal/external
 partners to develop natural flood risk management solutions for the Morlais drainage corridor that will
 introduce a reduction in flood risk and introduce ecological benefits to the surrounding areas.
- Strategic Taff Catchment Partnership MTCBC are a committed stakeholder in the Strategic Taff catchment initiative led by NRW and also partnered by RCTCBC, CCBC and DCWW. The long term strategic project will look to develop catchment level opportunities along the river Taff corridor to reduce flood risk and introduce environmental benefits.

Sustainable Drainage

Schedule 3 of the Flood and Water Management Act 2010 requires that all new developments over 100m² in construction area and incorporate sustainable drainage that are designed to meet a pre-defined set of standards. The standards ensure new surface water do not increase the risk of surface water flooding, ensure biodiversity and amenity values are enhanced and that appropriate maintenance arrangements are in place to ensure functionality. The

legislation places a duty on MTCBC to act as a SAB who is responsible for the technical approval of surface water drainage for new developments and in some instances are required to adopt and maintain sustainable drainage features within developments. Effective sustainable drainage systems should mimic natural surface water drainage pre-development thus, ensuring the risk of flooding as a consequence of new development is not increased and reduces the pressure on receiving water bodies. Introducing SuDS into new developments does not improve the overall flood risk picture but maintains the status quo. In order to see an overall reduction in flood risk, MTCBC will seek opportunities to retrofit SuDS into existing development where surface water flooding problems exist and will be included within our action plan.



7. STRATEGIC OBJECTIVES

7.1 NATIONAL STRATEGY OBJECTIVES

In July 2020, NRW, working on behalf of Welsh Government developed a National Strategy for Flood and Coastal Erosion Risk Management (FCERM), detailing how it is intended to manage flood risk from the sea, rivers and surface water in Wales. The flooding events of 2020, emphasised the need to reinforce strategic priorities for flood prevention, resilience and climate adaptation and the updated strategy introduced a series of overarching objectives in order to achieve this.



Figure 11 National strategy objectives

7.2 OBJECTIVES IN OUR AREA

The National strategy includes five overarching objectives for the effective management of flood risk across Wales. Based on the results of a recent flood risk management survey, our local strategy will focus on four overarching objectives that are consistent with the survey responses but also to align with the objectives set out in the National strategy. The objectives are intended to be high level priorities that provide a framework for the underlying detailed Measures and Action Plan. MTCBC's strategic overarching objectives are outlined in table 3.

	National Strategy Objectives				
MTCBC Local Strategy Objectives	Α	В	С	D	E
1. Improve our understanding of risk	•	•			
2. Preparedness and communication	•	•			
3. Reduce surface water flooding to the highest risk communities			•	•	
4. Provide an effective and coordinated response to flood events					•

Table 3 MTCBC strategy objectives

As outlined in Section 2.4, the objectives are broad overarching targets or outcomes for flood risk management in Merthyr Tydfil County Borough. These objectives are underpinned by more detailed measures, and specific deliverables contained in an Action Plan.

8. WHAT IS THE RISK OF FLOODING IN OUR AREA?

Flooding is a natural phenomenon which has can have devastating consequences and the risk of flooding and flash flooding is increasing across the UK. It is thought that climate change is a key factor in the frequency of intense and prolonged rainfall events, not only in the UK, but across the globe. Whist prolonged rainfall events that lead to flooding tend to occur during the winter months, it is now common occurrence to see intense rainfall events throughout the year where the ground is unable to absorb water quickly enough and drainage infrastructure can become overwhelmed leading to flooding.

Flood risk is the likelihood of flood event happening and the impact that it may have. Not only does flooding impact property but also to infrastructure, sites of nature conservation, ecology. There are a variety of methods for assessing flood risk as detailed in section 4.1. This flood risk can come from multiple sources and can be generally categorised as per table 4.

Main Rivers	Flooding from main rivers usually occurs after periods of prolonged and intense rainfall causing drainage catchments to become extremely active. The natural river channel becomes overwhelmed and water breaches the embankment or flood defence structure then inundates the adjacent flood plain and properties or infrastructure within it. Within the Merthyr borough there are four main rivers – Rivers, Taff, Taff Fechan, Taf Fawr and Bargoed Taf. There are currently 3200 properties as risk of flooding from main river within the borough. Data contained within the Communities at Risk Register identify the areas most at risk of flooding from rivers and the sea in NRW's South Central Flood Risk Management Plan as 'Merthyr Tydfil' and 'Troedyrhiw'.			
Ordinary watercourses	An ordinary watercourse can usually be identified as any channel which carries water at any time (including brooks, streams, ditches, drains, cuts, dykes and sluices) A channel is still defined as a watercourse even if it does not flow all year, or if it only flows during storm conditions. Flooding from ordinary watercourses can occur when the channel become inundated due to the capacity becoming overwhelmed leading to overtopping. This is normally the result of poor maintenance or excess surface water volume entering the channel. In addition, ordinary watercourses are culverted where they pass beneath urban areas and blockages at the culvert inlets/outlets or excess surface water volume can cause flooding to the surrounding area. It is estimated that there 900 properties within the borough within 20m of an ordinary watercourse and could be at risk of flooding.			
Surface water flooding	Surface water flooding occurs when the volume of rainwater falling cannot drain away through existing drainage systems or by filtering into the ground. As a result, the water lies on the ground and may begin to flow – causing localised floods. Typically, surface water flooding is caused by the amount of rainfall and the high speed at which it hits the ground. This causes a build-up that prevents the existing			

	drainage systems from draining it. Surface water can also occur due to overtopping of ordinary watercourses. Current modelling suggests that there are approximately 2200 properties in the borough at high risk of flooding from surface water.
Ground water	Flooding from groundwater can happen when the level of water within the rock or soil underground known as the water table rises. When the water table rises and reaches ground level, water starts to seep through to the surface and flooding can happen. Within our borough, ground water flooding can also occur within disused
Condensatio	mine workings resulting in flood water emanating from the mine entries and flooding the surrounding area. Groundwater flooding is much slower to occur than surface water flooding – it will usually happen days or even months after heavy or prolonged rainfall. Due to its unpredictable nature, it's impossible to estimate the overall flood risk from groundwater although the measures within this strategy endeavour to gain a better understanding of its causes and how to manage it.
Surface water / Combined / Foul sewers	Sewer flooding is a direct result of either blockages in the sewer network causing sewage to back up and surcharge through pipes and manholes or, it is where excess surface water enters the sewage network and the piped system doesn't have the sufficient capacity to cope with the additional demand leading to surcharging of pipe and manholes. Whilst it is difficult to predict how many properties may be at risk of sewer flooding. DCWW are developing schemes to remove surface water
	from their networks to reduce the risk of sewer overloading.
Highway Drainage	Similarly to sewer flooding, highway flooding occurs when highway gullies are blocked and the highway cannot drain or the piped system cannot cope with an increased demand during flashy, intense storms leading to surcharging pipes and manholes. In the Merthyr Borough, a high percentage of highway gullies are connected directly to the sewerage network – normally combined sewers. Combined sewers drain sewage from our toilets, showers etc. but also drain
	surface water from the rooves of our homes. When a combined sewer network is running at 80 – 90% capacity during prolonged or intense storms, there is sometimes no additional capacity to drain the highway, leading inundation of the highway.

Table 4 Types of flooding mechanisms

8.1 HOW WE ASSESS FLOOD RISK

In the Merthyr borough, flood risk is primarily assessed using a combination of surface water flood mapping, CaRR data, property data, flood asset register and local knowledge drawn from residents and operational staff who work for the authority. During the development of our analysis areas a combination of datasets, flood mapping and records were utilised to determine food risk within the boroughs communities.

- FRAW Maps are a GIS based map developed by Natural Resources Wales which provides an overview of flood risk
 across Wales from multiple sources including flooding from rivers, surface water, smaller watercourses and
 reservoirs. The maps are generated using statistical/mathematical data combined with topographical data to give
 an indication of water flow paths and provide risk mapping for three different storm scenarios.
 - LOW RISK 1in1000 year or a 0.1% chance of occurring in a given year
 - MEDIUM RISK 1in100 year or a 1% chance of occurring in a given year
 - HIGH RISK 1in30 year or a 3.3% chance of occurring in a given year

The maps are an invaluable indicator of potential flooding hotspots although have to be used with a combination of other factors in order to understand the risk fully.

- **Communities at Risk Register** is a dataset developed by NRW and provides a national assessment of flood risk and hazard from all sources of flooding. It was produced by NRW, on behalf of the Welsh Government, to provide an objective method for identifying risk and prioritising flood risk management activities at a Wales wide, community level. Whilst the CaRR provided excellent early insight into high risk areas, it doesn't always give a real world picture of flood risk from surface water. For this strategy, the CaRR data has been used in combination with the FRAW maps to help us get a more accurate assessment of flood risk scenarios across our community analysis areas.
- Flood Defence Records are maintained by MTCBC within an asset register and is a regulatory requirement of the Flood and Water Management Act 2010. All known and accessible flood defences have been and continue to be inspected by the Local Authority. Specific data is recorded against these assets including, age, construction, size and condition. This data is critical in assessing the suitability of existing infrastructure based on drainage requirements and highlights high risk areas within our communities.
- Drainage Catchment Polygons have been developed by MTCBC and illustrate the drainage basin areas for ordinary
 watercourses across the borough. Combined with FEH runoff characteristic data, they help us to understand if
 current flood defences are fit for purpose and have sufficient capacity in line with climate change adaptation
 standards.
- Historical Flooding Records and Local Knowledge are an invaluable source of understanding flood risk within our communities. We source historical flooding data from MTCBC Emergency Planning department in order to map, analyse and understand where the problematic areas are in the borough. We also draw on the evidence and "on the ground" knowledge from MTCBC colleagues and residents to understand what the known issues are. Post flood investigations play a vital role in understanding surface water flood risk across the borough and indicate to us where investment is needed.

For the purposes of our local strategy, we have assessed flood risk at a community level by dividing the borough into **12** analysis areas. The provided CaRR community boundaries didn't reflect our communities accurately in a number of instances. In order to ensure the analysis boundaries are meaningful to residents within the borough, the flood risk analysis boundaries have been based on a combination of ward boundaries, community extents and the drainage catchments serving them.

The specific communities are detailed in Table 6 and analysis areas are shown in Figure 13.

Community	Analysis Area
Pontsticill/Pontsarn/Llwyn-Onn/Trefechan/Cefn Coed	Vaynor
Heolgerrig/Clwydyfagwyr/Castle Park/Gellideg/Rhydycar/Ynys Fach	Cyfarthfa
Gurnos/Cyfarthfa/Georgetown/Williamstown/The Quar	Town North
Abercanaid/Upper Abercanaid	Abercanaid
Troedyrhiw/Mount Pleasant	Troedyrhiw
Aberfan	Aberfan
Merthyr Vale/Mount Pleasant	Ynysowen
Treharris/Edwardsville/Quakers Yard	Treharris
Trelewis/Merthyr Garden Village/Cwmfelin/Bedlinog/Merthyr Common	Bargod Taf
Twynrodyn/Thomas Town/Pontmorlais/Ysgubor Newydd/Mountain Hare/Town(South)/Cwmblacks	Town South
Penydarren/Dowlais/Pengarnddu/Pen-y-wern/Pant/Galon Uchaf	Morlais
Pentrebach	Pentrebach

Table 5 Analysis areas



Figure 12 Analysis areas

Whilst the FRAW mapping doesn't provide a "real world" assessment of flood risk in all instances, the surface water flood mapping gives an initial indication of where the communities that may be at higher risk of flooding exist. The surface water flood maps provide a high level understanding of flood risk within each analysis area and allows for designation of risk categories based on properties at **HIGH**, **MEDIUM** and **LOW** risk of flooding as set out in table 6. Figure 13 provides a visual representation of each analysis area and its risk rating based on the FRAW mapping and affected residential and commercial properties.

In many instances, the FRAW maps do **not** account for the presence of culverted watercourses and flood extents may be based on a blockage scenario.

Risk Rating	Affected Property Range (Residential + Commercial)		
Low	0 to =<100		
Medium	101 to =<200		
High	=>201		

Table 6 Risk rating parameters



Figure 13 Analysis area risk ratings

8.2 OVERVIEW OF FLOOD RISK IN OUR AREA

It should be accepted that flooding and the effects of it are becoming more common and it is important to be understood that the likelihood cannot be eradicated and due to the effects of climate change, it is a natural phenomenon expected to occur more frequently and one we'll need to manage and inform of more effectively. Constructing flood defences can only solve part of the problem. A recent report by NRW on 'Long Term Investment Requirements for Flood Defences in Wales'¹⁴ highlights that keeping pace with future climate change projections for Wales over the next century for all flood defences would require 3.4x more funding. Even if this level of investment was possible there would still be residual damages and certain areas will not be cost-effective to defend.

A much wider collaborative and holistic approach to managing flood risk across RMAs and responsible partners is required. Communities in higher risk areas should be well informed and resilient enough to prepare for flooding events by having the tools to protect their own properties and have the support required post flooding incident.

Flooding is being experienced both with greater frequency and more impact. This may be because of:

- climate change
- deficiencies in infrastructure, its management and maintenance
- the complexity of stakeholder roles and responsibilities and, in some instances, a lack of clarity and willingness to accept responsibility
- a lack of understanding of flood risk

These factors are common contributors to flood risk as a whole and the Merthyr Tydfil Borough is no exception. Through this local strategy, we will seek to address these causes by implementing a short, medium to long term action plan which will detail specific actions within each community of the borough to address flood risk and build resilience without exception. The action plan will be a living document, updated periodically as actions are progressed and a progress report completed every **12** months for internal review. The Local Strategy will be reviewed and updated every **6** years.

In the Merthyr borough, there are some communities at higher risk than others but no community is immune from its potential and all should understand how to act, when to act and what to do when the flood waters have receded.

		High (Q30)	Medium (Q100)	Low (Q1000)
1	Public health consequences – Potential number of people to be flooded (2.23 multiplied by the number of properties)	5,920	6,100	12,367
		% Population		
		10	10	21
2	Other human health consequences – Potential number of critical services to be flooded	22	25	54
3	Economic consequences – Potential number of non-residential properties to be flooded	321	334	535

The Key Flood Risk Indicators for the MTCBC have been derived in table 7.

Table 7 MTCBC flood risk indicators

The major contributing sources of flood risk in the Merthyr borough are predominantly from four main sources;

Fluvial Flood Risk

This strategy does **not** seek to address the likelihood of flooding from main river, although there are clear overlaps between fluvial and pluvial flooding mechanisms that need to be considered.

Merthyr Tydfil sits at the head of the River Taff catchment at the southern border of the Bannau Brycheiniog National Park. Pontsticill reservoir 4km to the north east, control flows to the Taf Fawr river and Llwyn-Onn reservoir 4km to the north east controls flows to the Taf Fechan river. The convergence point for the two rivers and head of the River Taff is located 1km to the north of Merthyr Tydfil town centre. The north of the Taff catchment is relatively steep, has relatively few tributaries and communities are relatively well protected. As the river catchment travels through the more southern communities of Pentrebach, Troedyrhiw and Aberfan, the catchment levels off and river levels have been subject to significant rise and river overtopping has been recorded in the villages of Troedyrhiw and Aberfan. The communities are now protected by flood bunds constructed to manage 1in100 year flood levels in the wake of historic fluvial flooding events. To the east of the borough is the head of the Taff Bargoed river catchment sourced just to the south of the Ffos y Fran open cast mine site and is largely rural along its length. The river passes through the villages of Bedlinog, Trelewis, Treharris and converges with the River Taff at Quakers Yard, the most southerly village in the borough. During Storm Dennis, the Taf Bargoed is known to have overtopped at Mill Street and flooded properties in the Quakers Yard community.

Pluvial Flood Risk (Ordinary Watercourses, Surface Water)

The general topography within the borough tends to be steep sloping hillsides at the top of drainage catchments leading to the narrow valley floor at river level which gives rise to "flashy" catchment reactions to intense rainfall in winter and summer leading to some systems becoming overwhelmed and unable to cope with the increased demand. In the Merthyr Borough there are 61 named watercourses which are defined as major ordinary watercourses and pose the greatest risk to widespread flooding. As the borough is largely urbanised, large sections of these watercourses are routed through culverts of varying construction and condition. The greatest flood risk from these types of systems is catastrophic structural failure or blockages at culvert inlet structures. Within some areas of the borough, there is an ageing drainage infrastructure and without investment into condition surveys, rehabilitation and appropriate maintenance, the two scenarios have potential for widespread flooding. Overtopping of open sections of ordinary watercourses is also a flood risk across the borough. Without investment in to desilting, vegetation clearance and embankment improvements, flood risk of this nature is amplified.

Due to the steep valley slopes in certain areas of the borough, particularly during the winter months, surface water flooding is a risk to all communities. Saturated ground higher up in the drainage catchments increases surface run off and impacts the ability of ordinary watercourses and culverts to drain efficiently. When considering the impacts of climate change with more intense, prolonged rain fall events in winter and summer, ensuring the existing land drainage infrastructure is maintained and where necessary is improved, is essential in reduce flood risk and protecting communities.

Groundwater

Groundwater flow is somewhat different to surface water runoff. Rainwater penetrates through the sub-soil material before percolating through the rock strata and, in many instances in the borough, into historic mine workings. When coalmines were operational, most of the groundwater was controlled by pumping excess water into local drainage systems. Existing culverts or ordinary watercourses were used to take the flow before the water discharged into local rivers. Since the closure of the mines pumping has ceased and many of the mine workings have filled with water over time. The water generally escapes through old mine entrances such as adits and mine shafts. Occasionally water from

old mine workings discharges at unexpected locations particularly on the hillsides below. During storm Dennis, groundwater from old mine workings became problematic above the eastern and western hillsides of Troedyrhiw and above Pentrebach. It is understood that excess ground water emanating from the workings, adits and shafts, contributed to the inability of receiving watercourses and culverts to cope leading to flooding across the two communities. The action plan will allow for investigation in to the location of mine water flows and their likely volume as there is evidence that indicates such flows present a flood risk.

Sewer/Highway drainage

Flooding from highway drainage systems usually takes place as a result of short duration storms of very high intensity. Flooding often commences due to the inability of gullies to take the volume of water. This is usually as a result of gullies being blocked by debris washed off the roads filling the gullies. MTCBC mitigate the effects of gullies blocking by having an operational procedure that ensures that gullies are cleaned at least twice a year. They are also cleared when blockages are reported by members of the public. Highway drainage may also be a source of pollution from hydrocarbons. This is particularly acute when prolonged dry periods are followed by intense rainfall. This is particularly adverse for the first 5mm flush of surface water runoff.

The overall risk to receptors within the Merthyr Borough are summarised in table 8. Flood risk to receptors are categorised as follows:

- High Risk (Q30) 3% chance of flooding in a given year.
- Medium Risk (Q100) 1% chance of flooding in a given year.
- Low Risk (Q1000) 0.1% chance of flooding in a given year.

Risk Receptor	High Risk (3%)	Medium Risk (1%)	Low Risk (0.1%)
Residential properties at risk of flooding (depth >0.0m)	2574	2652	5377
Residential properties at risk of internal flooding (depth >0.2m)	1908	2416	4117
Essential Services (n)	22	25	54
Non-Residential Properties (n)	321	334	535
Primary/Trunk Roads (km)	4.31	2.09	5.04
Main Line Railways (km)	0.17	0.05	0.16
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	9.33	2.21	6.94
Sites of Interest for Nature Conservation (SINC)	63.65	13.68	48.46
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0.13	0.01	0.23
Ancient Woodland (ha)	10.00	1.85	6.19
Registered Parks and Gardens (ha)	2.34	0.79	2.89
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	2.74	0.32	1.14
Listed Buildings (n)	17	17	56
Essential Settings of Regional Planning Guidance (ha)	1.18	0.22	0.81

8.3 FLOOD RISK IN YOUR COMMUNITY

The following section provides a brief overview of flood risk within each analysis area and discusses any likely sources of surface water flooding.



A - Vaynor

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Vaynor is the most northerly and largest analysis area in the borough. The area is largely rural and covers an area of 2895Ha with the communities of Pontsticill, Trefechan and Cefn Coed y Cymmer within the boundary. The Lwyn-Onn and Pontsticill reservoirs sit to the east and west of the area and feed the Taf Fechan and Taf Fawr rivers. Five major ordinary watercourses exist within the area although due to their rural locations, other than some highway flooding, pose little or no flood risk to properties or services. Flooding incidents tend to occur due to blocked culverts resulting in flooding of the highway from Pant to Pontsticill and Trefechan to Pontsarn. Flooding to properties, tends to be rare. Groundwater issues close to the Pontsarn and Pontsticill communities have led to significant landslides that have affected only transport links, not properties.

Culvert inlets	High Risk culvert	Council	Private
		responsibility	Responsibility
30	0	6	24

The receptor counts indicate the overall flood risk rating for the Vaynor analysis area is LOW.
Risk Receptor	High Risk (3%)	Medium Risk (1%)	Low Risk (0.1%)
Residential properties at risk of flooding (depth >0.0m)	17	25	90
Residential properties at risk of internal flooding (depth >0.2m)	16	28	64
Essential Services (n)	2	0	3
Non-Residential Properties (n)	5	4	7
Primary/Trunk Roads (km)	0.34	0.08	0.84
Main Line Railways (km)	0	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0.85	0.09	0.36
Sites of Interest for Nature Conservation (SINC)	0	0	0.07
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	1.40	0.35	0.88
Registered Parks and Gardens (ha)	0.08	0.01	0.08
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0.07	0	0.05
Listed Buildings (n)	4	3	3
Essential Settings of Regional Planning Guidance (ha)	0.15	0.04	0.13

B – Cyfarthfa



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Cyfarthfa sits to the north west of Merthyr borough, has an area of 705Ha. The communities of Heolgerrig, Clwydyfagwyr, Castle Park, Gellideg, Rhydycar and Ynys Fach are within the analysis boundary with the A465 and A470 trunk roads bordering the area to the north and west. Cyfarthfa is largely urbanised to the east with the Nant Cwm Pant Bach and Nant Cwm Glo watercourses to the south routed immediately to the south of the Heolgerrig community. Cyfarthfa analysis area has been subject to historic coal mining activity resulting in the formation of numerous unnamed watercourses which are culverted for large sections across the area and groundwater issues are frequent. The high number of culverted watercourses sees ten high risk culvert inlets across the Cyfarthfa area which is reflected in the FRAW maps and resulting receptor counts.

Culvert inlets	High Risk culverts	Council responsibility	Private Responsibility
46	13	29	17

The overall flood risk rating for Cyfarthfa is **HIGH.**

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	377	404	865
Residential properties at risk of internal flooding (depth >0.2m)	234	316	684
Essential Services (n)	3	3	6
Non-Residential Properties (n)	21	17	30
Primary/Trunk Roads (km)	0.45	0.21	0.72
Main Line Railways (km)	0	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	8.20	1.95	6.05
Sites of Interest for Nature Conservation (SINC)	23.38	4.68	15.38
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	0.18	0.02	0.03
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0.65	0.16	0.46
Listed Buildings (n)	1	1	7
Essential Settings of Regional Planning Guidance (ha)	0	0	0



E – Town North

With the exception of Cyfarthfa Park, the Town North analysis area is predominantly urbanised, covers an area of 360Ha and includes the communities of Gurnos, Cyfarthfa, Georgetown, Williamstown, the Quar and Abermorlais within the analysis boundary. Town north sits at the head of the river Taff catchment and the convergence point for the Taf Fawr and Taf Fechan immediately to the west of Cyfarthfa Park. The park, which is the site of a designated reservoir, Cyfarthfa Lake, sits centrally within the area and the A465 dual carriageway borders the northern reaches. The Morlais brook culvert skirts the south western boundary and there are numerous other unnamed watercourses that are culverted beneath the urbanised areas. The maps show that mechanisms for flooding to receptors is predominantly from overtopping of a culverted system to the west in Heolgerrig and overtopping of the Morlais brook culvert at Penydarren roundabout to the east.

Culvert	High Risk culverts	Council	Private
inlets		responsibility	Responsibility
34	1	13	21

The overall flood risk rating for Town North is **HIGH**.

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	306	357	691
Residential properties at risk of internal flooding (depth >0.2m)	269	331	546
Essential Services (n)	2	3	9
Non-Residential Properties (n)	28	38	66
Primary/Trunk Roads (km)	0.16	0.03	0.15
Main Line Railways (km)	0	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (Ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	0.18	0.01	0.06
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	0.14	0.01	0.09
Registered Parks and Gardens (ha)	0.84	0.15	0.54
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0.01	0	0.01
Listed Buildings (n)	2	0	7
Essential Settings of Regional Planning Guidance (ha)	0	0	0

D – Abercanaid



Abercanaid analysis area sits to the north west of the borough with the communities of Upper Abercanaid and Abercanaid within its boundary and is approximately 755Ha. The area is largely rural with the two communities located to the far eastern reaches of the analysis area between the A470 trunk road and immediately adjacent to the river Taff. The drainage catchment has two major ordinary watercourses, the Nant Canaid and Nant Graig and are culverted beneath the A470 trunk road and the built up areas. Receptor surface water flood risk in the area tends to be sourced from the two primary ordinary watercourses although there is significant flood risk from the historic Glamorganshire canal which is known to be predominant source of risk to the industrial areas further north. There are three high risk culvert inlets which give rise to some surface water flooding to the southern residential areas although it is not significant.

Culvert	High Risk culverts	Council	Private
inlets		responsibility	Responsibility
30	13	18	12

The overall risk rating for Abercanaid analysis area is LOW.

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	46	44	131
Residential properties at risk of internal flooding (depth >0.2m)	43	45	113
Essential Services (n)	0	0	1
Non-Residential Properties (n)	4	3	5
Primary/Trunk Roads (km)	0.18	0.12	0.55
Main Line Railways (km)	0	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	1.00	0.18	0.51
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	1.83	0.25	1.02
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0.38	0.07	0.30
Listed Buildings (n)	1	2	23
Essential Settings of Regional Planning Guidance (ha)	0	0	0



E – Troedyrhiw

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The Troedyrhiw analysis area is situated in the central sector of MTCBC and the boundary only includes the village of Troedyrhiw. It covers an area of 620 hectares consisting mainly of hillside that slopes steeply down to the Afon Taf from both the east and west. The upper catchments are largely rural and the urban areas are generally concentrated on low lying land in the valley floor on both banks of the River Taff. The western catchment is drained by the Nant Cwmdu which is culverted as the watercourse meets the urbanised areas and is shown as having potential to cause some significant flooding. The historic Glamorganshire canal extends the full length of the area and also is shown to have potential for flood risk. The eastern side of the analysis area sees the drainage remnants of coal and iron stone working. The Plymouth feeder that historically supplied water to the iron works in the area indicates a significant and widespread surface water flood risk. Post Storm Dennis, a flood defence scheme was designed and implemented to protect the community from this flooding mechanism as detailed in section 5.4. There are also numerous unnamed watercourses emanating from the coal workings that pepper the eastern hillside that contribute to the flood risk at the valley floor.

Culverts	High Risk culverts	Council responsibility	Private Responsibility
30	6	21	9

Due to the widespread surface water flooding modelled and the number of receptors affected, the overall risk rating for the Troedyrhiw analysis area is **HIGH**.

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	442	346	385
Residential properties at risk of internal flooding (depth >0.2m)	434	451	489
Essential Services (n)	5	5	5
Non-Residential Properties (n)	39	33	42
Primary/Trunk Roads (km)	0.28	0.14	0.34
Main Line Railways (km)	0.02	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	6.15	2.20	8.12
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	0.86	0.16	0.64
Registered Parks and Gardens (ha)	1.14	0.63	2.28
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0	0	0
Listed Buildings (n)	1	0	0
Essential Settings of Regional Planning Guidance (ha)	1.04	0.19	0.69



F – Aberfan

Aberfan Community Area is situated in the south western sector of MTCBC. It covers an area of 440 hectares consisting mainly of hillside that slopes steeply down from the west to east with the housing concentrated in the valley floor between the A470 dual carriageway and the western bank of the River Taff. The western sector of the area is largely rural and are drained by the Nant Maen and the Nant Aberfan that are open watercourses prior to being culverted beneath the A470 and urbanised areas. There are numerous unnamed watercourses within the central sector which pose minor surface water flood risk. The historic Glamorganshire canal extends the full length with a number of minor watercourses feeding in to it, increasing the flood risk from this source. Surface water flood risk within the Aberfan analysis area tends to be in isolated although the majority of recent flooding incidents have occurred in the north of the area. Drainage improvement works have been undertaken in the Pant Glas Fawr area to protect residents from future surface water flooding.

Culverts	High Risk culverts	Council responsibility	Private Responsibility
40	2	14	26

The receptor counts indicate that the risk rating for the Aberfan analysis area is **MEDIUM**.

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	100	104	212
Residential properties at risk of internal flooding (depth >0.2m)	79	105	162
Essential Services (n)	0	0	2
Non-Residential Properties (n)	3	6	15
Primary/Trunk Roads (km)	0	0	0.06
Main Line Railways (km)	0	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	0.31	0.14	0.63
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	0.21	0.08	0.24
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0	0	0
Listed Buildings (n)	0	0	0
Essential Settings of Regional Planning Guidance (ha)	0	0	0



G – Ynysowen

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Ynysowen analysis area is situated in the south central sector of MTCBC. It covers an area of 389 Ha consisting mainly of hillside that slopes steeply down from the east to west with housing concentrated on the lower slopes and in the valley floor on the eastern bank of the River Taff. There are no major watercourses in the area catchment drains into the River Taff through a number of un-named watercourses. Whilst the surface water flood maps don't indicate any significant flooding to receptors, historically, ground water issues from the steep hillside, quarries and tips to the east of the area tend to lead to some flooding of properties and the highway.

Culverts	High Risk culverts	Council responsibility	Private Responsibility
4	0	4	7

Although isolated flooding incidents from groundwater occur within the analysis area, the receptor counts indicate that the flood risk rating for Ynysowen analysis area is **LOW**.

Risk receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	11	27	51
Residential properties at risk of internal flooding (depth >0.2m)	8	25	53
Essential Services (n)	0	0	1
Non-Residential Properties (n)	0	2	5
Primary/Trunk Roads (km)	0	0	0
Main Line Railways (km)	0.10	0.04	0.08
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	0.05	0.02	0.09
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	0.03	0.05	0.07
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0	0	0
Listed Buildings (n)	0	0	0
Essential Settings of Regional Planning Guidance (ha)	0	0	0



H – Treharris

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Treharris analysis area is situated at the southern extremity of MTCBC. It covers an area of 780Ha consisting mainly of steeply sloping hillside down to the valley floor where the rivers Taff and Bargoed are routed and ultimately converge. The upper catchment is largely rural with some agricultural settings and Edwardsville, Treharris, Craig Berthwyd and Quakers Yard make up the urbanised communities within the area. The large catchment above the villages of Edwardsvile and Treharris are drained by the Nant Ddu/Nant Ddu Fach and a number of unnamed watercourses which culverted for large parts and discharge directly into the River Taff. The eastern sector drains into the Nant Cothi which discharges into the Bargod Taf. In the extreme south, the catchment is drained into the River Taff via the Nant Mafon. Flood modelling indicates that the main cause of flood risk for the area relates to ordinary watercourses and the intakes to existing surface water culverts. There is also a risk from accumulations of surface water on highways and groundwater on the steep hillsides above Edwardsville and northern Treharris has historically been an issue.

	Culverts	s High Risk culverts	Council responsibility	Private Responsibility	
36 1 12 24	36	1	12	24	

Receptor counts indicate that the surface water flood risk rating for Treharris analysis area is LOW.

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	48	66	177
Residential properties at risk of internal flooding (depth >0.2m)	26	47	112
Essential Services (n)	0	1	2
Non-Residential Properties (n)	4	4	10
Primary/Trunk Roads (km)	0.13	0.08	0.15
Main Line Railways (km)	0.01	0	0.06
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	6.35	1.35	4.26
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	1.94	0.35	0.88
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0	0	0
Listed Buildings (n)	0	0	1
Essential Settings of Regional Planning Guidance (ha)	0	0	0



I – Bargod Taf

Bargod Taf is the second largest analysis area and covers an area of 2050Ha. The area is defined by the Bargod Taf drainage catchment and extends from Trelewis in the south to the Ffos y Fran open cast mine in the north. The catchment is predominantly rural with steep valley slopes to the east and west and with the exception of some agricultural settlements, Trelewis and Bedlinog are the only urbanised communities within the area. There are numerous named watercourses within the catchment –Nant Gyrawd and Nant Gruffud openly drain to the Bargod Taf in the northern sector. Nant Llwynog, Nant Wen, Nant y Fedw and Nant y Garth drain the catchment surrounding Bedlinog in the central sector and the catchment surrounding Trelewis predominantly drains to the Nant Caeach in the southern sector. There are also numerous unnamed ordinary watercourses within the catchment that are culverted beneath the urbanised areas and highways that link the valley communities. The FRAW maps don't show any significant flooding across the area although due to the steep valley slopes, during the winter months, high run off rates tend to overwhelm some drainage systems leading to localised flooding incidents to properties, land and sections of highway.

Culverts	High Risk culverts	Council responsibility	Private Responsibility
83	4	34	49

Due to the rural nature of the analysis area, low receptor counts indicate the overall risk rating for Bargod Taf is LOW.

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	53	56	207
Residential properties at risk of internal flooding (depth >0.2m)	30	43	132
Essential Services (n)	1	2	1
Non-Residential Properties (n)	4	2	13
Primary/Trunk Roads (km)	0	0	0
Main Line Railways (km)	0	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	6.92	1.52	6.13
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	1.64	0.37	1.36
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0.02	0	0.01
Listed Buildings (n)	0	0	0
Essential Settings of Regional Planning Guidance (ha)	0	0	0



J – Town South

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The Town South analysis area is located in the north eastern sector of the borough and spans an area of 525Ha. The area is split by the A4060 dual carriageway and is rural to the east of it and heavily urbanised to the west with the communities of Twynrodyn, Thomas Town, Pontmorlais, Ysgubor Newydd, Mountain Hare, Town(South) and Cwmblacks all within the analysis boundary. Drainage of the catchment falls from east to west predominantly serving the Ffos y Fran open cast mine and Merthyr Common. The northern sector of Ffos y Fran drains to two unnamed watercourses to the west of the A4060 which are culverted for large sections prior to linking to the Morlais Brook culvert at Penydarren. The southern sector, including part of Merthyr Common, drains to Nant Cwmblacs which is culverted from the A4060 to the River Taff. The FRAW maps indicate mechanisms of significant flooding from the Nant Cwmblacs culvert to the south of the area and overtopping of the Morlais Brook culvert at Waterloo House and overtopping of an unnamed watercourse at Heritage Court leading to flooding of the town centre.

Culverts	High Risk culverts	Council responsibility	Private Responsibility
59	5	22	36

Although significant flooding events are rare in this area, due to the significant widespread flooding indicated in the FRAW maps, increased receptor counts indicate the overall risk rating for Town South is **HIGH**.

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	482	508	1013
Residential properties at risk of internal flooding (depth >0.2m)	261	338	615
Essential Services (n)	1	2	4
Non-Residential Properties (n)	135	144	212
Primary/Trunk Roads (km)	1.43	0.90	0.98
Main Line Railways (km)	0.04	0.01	0.02
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	7.57	1.25	4.85
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	0.25	0.02	0.10
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	1.34	0.02	0.12
Listed Buildings (n)	4	8	13
Essential Settings of Regional Planning Guidance (ha)	0	0	0



K – Morlais

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Morlais analysis area is situated in the north eastern sector of the borough immediately to the north east of Merthyr town. Morlais covers an area of 1,195 Ha and is largely rural to the north of the catchment and heavily urbanised to the southern sector with condensed housing and the presence of heavy industrial areas. The urban areas are bordered to the east by the A4060 and split by centrally by the A465. The communities of Penydarren, Dowlais, Pen-y-wern, Galon Uchaf exist to the south of the A465 with Pant and Pengarnddu to the north. The catchment drains from north to south with the head of the Morlais Brook acting as the primary drainage path for the area. Due to the heavily urbanised nature of the southern part of the catchment, the Morlais Brook is culverted in its entirety to a small open section at Penydarren. Watercourses to the north of Pengarnddu are culverted beneath Dowlais and eventually converge with the Morlais Brook culvert at Penydarren. Top Pond and Middle Pond are two designated reservoirs either side of the A465 that also drain to the Dowlais culvert. The FRAW maps show overtopping of the Dowlais culvert leading to significant flooding of the Goatmill Road industrial area and isolated residential properties along its path.

Culverts	High Risk culverts	Council responsibility	Private Responsibility
52	2	44	8

Due to significant flooding within the southern sector and increased receptor counts, the overall flood risk rating for the Morlais analysis area is **HIGH**.

Risk Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	428	420	1157
Residential properties at risk of internal flooding (depth >0.2m)	268	383	759
Essential Services (n)	4	3	13
Non-Residential Properties (n)	54	54	91
Primary/Trunk Roads (km)	0.38	0.23	1.02
Main Line Railways (km)	0	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0.28	0.16	0.53
Sites of Interest for Nature Conservation (SINC)	11.32	2.12	7.59
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0.13	0.01	0.23
Ancient Woodland (ha)	0.12	0.01	0.04
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0.03	0.01	0.02
Listed Buildings (n)	3	3	2
Essential Settings of Regional Planning Guidance (ha)	0	0	0



L – Pentrebach

Pentrebach analysis area is situated in the central sector of the borough, to the south east of Merthyr town. The catchment covers an area of 413 Ha and is largely rural to the north east with steep sloping hillsides down to the valley floor where an urbanised concentration of housing and industrial areas exist. Pentrebach is the only community within the analysis area and is flanked by the A4060 and A470 dual carriageways to the west and the River Taff is routed through the south western border. Drainage for the catchment flows from north east to south west directly to the River Taff. Nant yr Odyn is a primary drainage route to the south of the village although some significant ordinary watercourses exist to the north likely to have been formed as a result of extensive coal mining in the area. Nant yr Odyn and the majority of the northern catchment, drain to the head of the Plymouth feeder which is also routed further south through the Troedyrhiw community. The FRAW maps show significant, widespread flooding in the analysis area with flooding mechanisms from multiple sources. The overtopping of the Nant Cwm Blacs culvert to the north sees surface water collecting at the foot of the A4060 along with overtopping of culverts serving two unnamed watercourses immediately to the north of Pentrebach, results in inundation of the Plymouth feeder routed through the centre of the village.

Culverts	High Risk culverts	Council responsibility	Private Responsibility
23	9	18	4

Due to significant flooding within the central sector and increased receptor counts, the overall flood risk rating for the Pentrebach analysis area is **HIGH**.

Receptor	High Risk (3% Annual Risk)	Medium Risk (1% Annual Risk)	Low Risk (0.1% Annual Risk)
Residential properties at risk of flooding (depth >0.0m)	264	295	398
Residential properties at risk of internal flooding (depth >0.2m)	240	304	388
Essential Services (n)	4	6	7
Non-Residential Properties (n)	24	27	39
Primary/Trunk Roads (km)	0.93	0.30	0.22
Main Line Railways (km)	0	0	0
Agricultural Land - Grades 1, 2 and 3 (ha)	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0
Ramsar Sites (ha)	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0
Sites of Interest for Nature Conservation (SINC)	0.47	0.21	0.78
National Nature Reserves (NNR) (ha)	0	0	0
Local Nature Reserves (LNR) (ha)	0	0	0
Ancient Woodland (ha)	1.41	0.18	0.82
Registered Parks and Gardens (ha)	0	0	0
Country Parks (ha)	0	0	0
Scheduled Ancient Monuments (SAM) (ha)	0.24	0.05	0.17
Listed Buildings (n)	1	0	0
Essential Settings of Regional Planning Guidance (ha)	0	0	0

9. FUNDING AND PRIORTISATION

9.1 FUNDING OPTIONS

Measures to manage local flood risk are funded from a range of sources.

Welsh Ministers may provide revenue and capital grants in relation to FCERM activities. The Welsh Government will work with RMAs to develop a 5 to 10 year investment programme of future FCERM capital schemes, justified in accordance with the FCERM Business Case Guidance¹⁵.

FCERM grant applications to the pipeline are made via the RWP online system and must be supported by the appropriate business case. The business case should be "objective-led" and follow the "Five Case Model" outlined in the FCERM Business Case Guidance. It should be noted that the majority of schemes submitted require a three stage development process for the business case which can take a number of years to progress. The grant rate determined by Welsh Ministers for FCERM funding provides 100% for schemes at outline and full business case stages (including detailed design) but the rate of grant reduces to 85% for the construction phase. Council or partnership funding will be required to cover the remaining 15% of construction phase cost.

The Welsh Government prioritises FCERM schemes which primarily reduce risk to homes. Businesses and public buildings can also benefit from schemes, in particular those which reduce risk to a mix of development types such as homes and shops along a high street or local district centre. Schemes which only reduce risk to businesses remain eligible but should not be prioritised over schemes which reduce risk to homes. Funding is not available to enable new development. RMAs applying for funding are encouraged to identify wider benefits such as regeneration opportunities, improvements to habitats/biodiversity, mental health or recreational benefits. Early consideration of aligning multiple benefits to secure wider funding is encouraged. Where significant benefits are identified to third parties, it is expected RMAs will work both internally and externally (for example with infrastructure providers, utilities, industry and commerce) to identify and secure appropriate partnership funding contributions from those benefitting from a scheme.

The Small Scale Works Grant supports Local Authorities to carry out smaller works, resilience measures on a community scale, NFM and essential maintenance through a simplified process. Funding is available annually for works up to £200,000 (2022/23) and has proved successful in driving delivery and risk reduction, with £4.3 million allocated for such schemes in 2020-21.

There are many other funding options available to support flood risk management related actions as outlined in section 10. These include other Welsh Government grants available to the LLFA, and grants which are accessible by other council departments or external partners whose work contributes directly to flood risk management.

MTCBC Capital Funding

Capital can be used to fund new assets or significant refurbishment to existing assets. Capital may be utilised to provide required match funding contributions for some flood risk management projects funded through Welsh Government's FCERM grants. Delivery of other flood risk management schemes may be funded through capital where appropriate.

Capital funding forms the core element of funding for the delivery of highway drainage works and investigation to determine the cause of highway flooding issues.

MTCBC Revenue funding

The majority of actions proposed to deliver the measures outlined in this strategy require time input from MTCBC staff, therefore the availability of staff resource will be critical to the delivery of this strategy. Revenue funding is the

primary source of funding for staff at MTCBC. Revenue funding can also be used for many awareness and education related actions, and staff training.

Welsh Government Flood Risk Revenue Grant

The Flood and Coastal Erosion Risk Management Revenue Grant is available from the Welsh Government to support Local Authorities in their FCERM activities that are not eligible for capital funding. Funding may be claimed biannually through the RWP online system. Activities covered by this grant include outreach and raising awareness, warning and informing, mapping and databases, and staff costs. A large number of actions proposed to deliver the LLFA measures in this strategy will fall under these categories making this grant a vital element of LLFA funding into the future.

Welsh Government Natural Flood Management Accelerator Grant

The Natural Flood Management Accelerator Programme was launched by Welsh Government in March 2023 to encourage RMAs to pursue NFM interventions to reduce risks associated with flooding or coastal erosion. NFM schemes funded by the programme will be offered 100% funding by WG, covering appraisal, design, construction and monitoring equipment. Catchment partnerships or partnership that access cross policy funding are encouraged. Schemes must reduce risk of flooding to people and properties or maintain current levels of protection, be economically worthwhile and have a value of no more than £300,000.

Applications are made via the RPW online system and similarly to the Small Scale Works Grant, local authorities are able to submit multiple applications. Schemes must be completed and claimed by March 2025.

Welsh Government Resilient Roads Fund

Welsh Government's Resilient Road Fund is available for projects that reduce disruptions to the highway network caused by severe weather such as flooding. Projects such as culvert improvements, ordinary watercourse works, highway drainage upgrades and overland flow route management that reduce flood risk to areas of the highway network with a history of flooding could be funded. £400,000 has been awarded to MTCBC for such schemes in 2023/24.

Applications for schemes can be submitted annually to Welsh Government. Match funding from the council is expected from schemes supported by this fund and regional partnerships are encouraged.

Welsh Government Local Transport Fund

The Local Transport Fund is available to deliver the priorities and vision of 'Llwybr Newydd' the Wales transport strategy 2021. Projects must be delivered in ways that are good for the environment and deliver a transport system that adapts to and mitigates for climate change. Flood risk management schemes that target highway flooding would mitigate for climate change impacts to the transport system in Merthyr Tydfil. The potential for the use of nature based solutions in this setting would help to meet the biodiversity and ecosystem resilience ambition of 'Llwybr Newydd'.

Applications for schemes can be submitted annually to Welsh Government. Match funding from the council is expected from schemes supported by this fund and regional partnerships are encouraged.

Welsh Government Active Travel Fund

The Council is able to bid annually for Welsh Government's Active Travel Fund for up to a maximum of 4 main schemes. This funding is available for schemes that implement the Active Travel Act. The majority of main schemes will require approval from SAB, therefore nature based surface water management is generally delivered through these schemes. Early engagement between Active Travel and LLFA teams has led to the delivery of a number of SuDS schemes in the public realm using Active Travel funding. It is proposed to maintain and expand on this relationship to deliver more urban SuDS to reduce surface water flood risk.

Section 106 & Community Infrastructure Levy (CIL)

Section 106 (S106) is a legal agreement made during the planning process between the applicant and the local planning authority that includes a request for contributions. S106 contributions for infrastructure can only be made for impacts directly related to the planning application being submitted or if they are necessary to make the application acceptable in planning terms. Contributions could be requested from developers to carry out flood risk management works on sites.

All new developments over 100 square meters (not including extensions or other home adaptations) are charged the Community Infrastructure Levy (CIL). Money raised through CIL goes into a central fund for council departments to bid for once there is a significant fund available. There are specific types of infrastructure that can be funded by CIL which includes the 'Strategic Drainage Network'.

Local Places for Nature Capital Fund

The Local Places for Nature Capital Fund is a grant fund designed to restore and enhance nature and increase access to nature for the 50% most deprived areas in Wales. It is jointly funded by the Welsh Government and The National Lottery Heritage Fund and open for applications annually. Through working in partnership with the MTCBC Countryside team, the LLFA has advocated for the inclusion of nature based solutions for flood risk management within the Local Places for Nature project bids. A currently approved bid (2023) includes the development of a wetland to reduce flood risk from a surface water sewer. This will continue to be a priority for future bids.

9.2 FUNDING OPTIONS FOR CO-DEVELOPED MEASURES AND ACTIONS

Partnership working is becoming an increasingly important way of delivering flood risk management schemes with multiple benefits.

Funding sources available to partners within the local authority with a direct link to flood risk management are outlined in section 8.1. In many cases other RMAs and external partners are able to access funding that is not directly available to the LLFA and therefore facilitate the delivery of a larger number of projects. Wider partnership working such as catchment partnerships increases the potential for accessing funding from 3rd sector organisations and private stakeholders.

Where projects delivered by the LLFA directly benefit 3rd parties, match funding or non-financial contributions such as land management action will be sought.

Due to the multidisciplinary nature of flood risk management, partnerships can be essential to ensuring the correct expertise and knowledge is inputted to projects. The sharing of knowledge on local flood risk issues can be very valuable and key to unlocking project delivery. It is often possible for the LLFA to deliver physical schemes through a partnership by contributing time and expertise in place of financial contribution.

9.3 HOW WE PRIORITISE FLOOD MEASURES AND ACTIONS

Funding from Welsh Government for FCERM schemes is subject to evidenced prioritisation. The primary aim of the funding is to reduce risk to existing homes, therefore schemes that provide flood risk reduction to the highest number of homes would be given the highest priority. Schemes can reduce risk to businesses and other infrastructure in addition to homes but these categories are of lower priority. The standard of protection delivered by schemes is not fixed by the Welsh Government, however schemes should aim to remove homes from high or medium risk.

A methodology for prioritising FCERM funding was approved in 2018 after consultation with RMAs. The following categories are used for scoring:

- Communities at Risk Register (CaRR) ranking
- Details of previous flood events
- Properties benefitting
- Benefit to cost ratio
- Opportunities for wider benefits
- Opportunities for partnership funding

MTCBC will utilise the CaRR ranking for schemes submitted to the FCERM Capital fund as requested by Welsh Government. CaRR will be used to prioritise flood risk management schemes from other funding sources where applicable however it should be acknowledged that CaRR is just one tool in the process to prioritise investment. It is apparent that CaRR points do not necessarily correlate with updated flood risk mapping for some areas in Merthyr Tydfil and this will be considered as part of MTCBC's prioritisation by utilising tools such as NRW's flood risk mapping and the National Receptors Database (NRD).

Records of previous flooding events are a very important tool for prioritisation and these details will be utilised where available. MTCBC are committed to improving their historic flooding records and have proposed a number of actions to improve the collection of data for future flood events.

The Welsh Government prioritises FCERM funding to schemes which primarily reduce risk of flooding to existing homes. Businesses and other infrastructure may also benefit, particularly in larger schemes which reduce risk to an area with a range of development types, for example Merthyr Tydfil High Street.

Benefit to Cost Ratio is a calculation required to undertake Cost Benefit Analysis. This type of economic analysis explores the project's Whole Life Benefits over Whole Life Costs. If the project has a Benefit Cost Ratio greater than 1 the benefits are equal to or greater than the cost and therefore it is economically viable. Schemes with a BCR of less than 1 are not considered for funding by Welsh Government.

Any wider benefits that can be achieved as part of a scheme in line with the Wellbeing of Future Generations Act will be pursued. These could include: biodiversity benefits of using NFM, improved access to riverside areas for residents or improved viability of an area for regeneration. Wider benefits can make a scheme more likely to receive third-party funding.

Opportunities for partnership funding will be sought on schemes that offer wider benefits. MTCBC will work with internal and external stakeholders to bring in additional funding where opportunities arise.

Community Scale Risk

As outlined in section 7.3, an overall risk level has been assigned to each of the 12 community analysis areas. For MTCBC funded flood risk management schemes, these risk levels will be considered during prioritisation of funding. Projects that reduce the risk to home and businesses in 'high' risk communities will be given higher priority.



10. FLOOD MEASURES

10.1 INTRODUCTION TO FLOOD MEASURES

This Strategy proposes a number of measures to outline how MTCBC intends to meet the objectives described in section 6.2 to reduce the present and future risk of flooding in Merthyr Tydfil County Borough.

The measures have been organised by the following categories:

- Development planning and adaptation
- Forecasting, warning and informing
- Studies, assessments and plans
- Outreach, awareness and engagement
- Preparedness and response
- Land and environmental management
- Asset management and maintenance

Indicative timescales and costs have been assigned to the measures to assist with prioritising and illustrating resources required to deliver these measures. All costs and timescales are best estimates and will be refined as the delivery of the strategy progresses. Many of the costs are informed by the actions in the Action Plan available in appendix A. Definitions for the timescale and cost wordings are provided below.

Timescales

- Short: 1-3 years
- Medium: 4-6 years (this strategy cycle)
- Long: 6-10 years

Cost

- Low: up to £10,000
- Medium: £10-100,000
- High: £100,000+

10.2 OUR MEASURES

Development Planning and Adaptation

Measure #1	Local Planning Authority (LPA)
Description	MTCBC's Replacement Local Development Plan (LDP) adopted in 2020 includes planning policy on flood risk under Policy 'EnW4'. The LLFA will continue to work with the LPA on future LDP updates to develop robust local planning policy relating to flood risk and drainage. This includes ensuring that new development is directed away from areas at risk of flooding helping to prevent exposure to risk.
	Local policies are strongly linked to TAN15 and Planning Policy Wales (PPW). The LLFA will work closely with the LPA to assist with changes resulting from the upcoming TAN15 update and SFCA updates to ensure that MTCBC's flood risk policies are appropriate and current.
	The consideration of flood risk and the provision of space to manage water is still an issue on many major developments. Consultation by developers with the LLFA is often left too late and other development pressures are prioritised in terms of land-take. We propose to work the LPA to improve the early stage consideration of flood risk by developers at Master Planning stage or earlier. This will be achieved through collaborating with the LPA on the development of masterplans for Strategic Development Sites, and inputting to potential SPGs to help guide smaller developments toward better allocation of space for flood risk management and biodiversity. It will be ensured that SuDS proposed by developers are also integrated with the townscape and historic environment of the site to provide sympathetic, high quality developments.
Benefits incl. multiple/wider benefits	 Directs development away from areas of high flood risk Better integration of flood risk management at early stages of development More efficient consultation with developers at earlier stages of development
Indicative timescale	Medium
Indicative cost	Low
Related objectives	3
Funding option(s)	Revenue
Delivery partners	LPA
Type(s) of flood management	Prevention

Measure #2	SuDS Approval Body (SAB)
Description	Schedule 3 of the Flood and Water Management Act (FWMA) 2010 places a duty on local authorities as SuDS Approving Body to approve, adopt and maintain sustainable drainage systems.
	The SAB has an influential role in controlling a proposed development's impact on downstream flood risk through the approval of discharge rate, location and the type of SuDS used on the site. There is scope for better integration between the LPA and the SAB when considering the flood risk to and from a development. This may be captured in the

	LDP review, through the development of Supplementary Planning Guidance and improved sharing of information between the SAB and LPA at application stage.
Benefits incl. multiple/wider benefits	 Reduced number of people at risk of flooding More sustainable development leading to more scope for development in the future The potential to use SuDS to manage the flood risk to a development as well as surface water discharge from the development
Indicative timescale	Medium
Indicative cost	Low
Related objectives	3
Funding option(s)	Revenue, SAB Income
Delivery partners	LPA
Type(s) of flood management	Prevention

Measure #3	Warnings and Forecast
Description	There are a number of warning systems that exist for both the public and first responders. Many of these services are supplied by the Met Office and include National Severe Weather Warnings, Flood Guidance Statements produced by the Flood Forecasting Centre (Met Office and EA partnership) and the online Hazard Manager system. These cover river, surface water and groundwater flood risk. NRW are responsible for providing early warning information for main river flooding. MTCBC will continue to support these providers in the communication of flood risk to the public.
	MTCBC is a Category 1 responder under the Civil Contingencies Act (2004). Category 1 responders are organisations at the core of emergency response who are subject to the full suite of civil protection duties. One of these duties is to 'warn, inform and advise the public in the event of an emergency'. We will continue to work with colleagues in emergency planning and communications to ensure that public warnings and information about flood emergencies are the best they can be. From our survey it was seen that greater use of social media for warnings was a very popular option. Whilst social media is a popular source of information for many residents we will ensure that this complements traditional methods of correspondence so as not to exasperate digital exclusion.
	improves the LLFA will keep abreast of solutions that become available for surface water flood forecasting and consider their benefit and suitability for use in Merthyr Tydfil.
Benefits incl. multiple/wider benefits	 The public are provided with clear and timely flood warnings allowing them to prepare and potentially reduce damages Potential for improved warnings for surface water flooding.
Indicative timescale	Low
Indicative cost	Medium
Related objectives	2, 4
Funding option(s)	Revenue
Delivery partners	MTCBC Emergency Planning, Corporate Communications
Type(s) of flood management	Preparedness and Response

Forecasting, Warning and Informing

Measure #4	Flood Monitoring
Description	Numerous past flooding events have been caused by issues with culvert intakes, such a blockages or capacity issues. As a result there are twenty three monitoring stations installed on high risk culvert intakes across the Borough.
	These monitoring stations have been unreliable and we therefore propose to improve this system in terms of both hardware and software. Following further catchment analysis proposed by this strategy, we intend to expand the monitoring system to include other high risk intakes.

Benefits incl. multiple/wider benefits	 Improved real time monitoring of flood risk Improved data on water levels in high risk areas to support catchment analysis Creates the opportunity for better response to culvert issues Improved maintenance due to better data collection and study of trends
Indicative timescale	Long
Indicative cost	Medium
Related objectives	1.2.3
Funding option(s)	WG Revenue Grant
Delivery partners	N/A
Type(s) of flood	Preparedness
management	

Studies, Assessments and Plans

Measure #5	Understanding Flood Risk
Description	Improving our understanding of existing flood risk across the Borough will enable us to better identify high risk areas.
	NRW flood risk mapping and historic flooding information has been used in this strategy to broadly identify the levels of risk across the Borough and highlight high risk areas. Catchment analysis and modelling will be carried out to pin point high risk assets and watercourses and guide intervention. Catchment analysis will also consider the wider benefits of flood risk management by increasing our understanding of ecological and water quality pressures in high risk catchments.
	Interrogation of NRW flood mapping has identified risk areas across the Borough that do not reflect the likely flow paths in practice. We will endeavour to carry out independent flood modelling and challenge the flood mapping with the data owner where contradictions occur. Since the flooding caused by Storm Dennis in 2020 a number of flood defence schemes and improvements have been carried out across the Borough. Flood modelling will be undertaken so that these improvements can be reflected in the national flood maps.
Benefits incl. multiple/wider benefits	 Targeting resistance and resilience schemes to areas at highest risk Increased understanding of flood mechanisms will allow for better flood response
	 Detailed interrogation of flood maps will provide a more accurate representation of flood risk in the borough
	 Increased understanding of wider pressure and opportunities Communicate risk more accurately
Indicative timescale	Long
Indicative cost	Medium
Related objectives	1, 2, 3, 4
Funding option(s)	WG Revenue Grant, FCERM pipeline
Delivery partners	N/A
Type(s) of flood management	Preparedness, Review

Measure #6	Flood modelling and surveys
Description	Survey data can inform a range of modelling techniques to improve and quantify our understanding of flood risk
	The surveying and modelling of flood risk assets and watercourses across the Borough greatly increases our understanding of risk and the mechanisms of flooding.
	Flood modelling will be used to inform future projects and interventions to ensure the schemes are located in the most effective locations for risk reduction. The use of modelling will also ensure that proposed schemes can be assessed against potential climate change impacts.

Benefits incl. multiple/wider benefits	 More efficient and cost effective interventions Improved understanding of flood risk and flood mechanisms. Potential for data sharing to improve flood risk knowledge for a number of stakeholders Increased understanding of flood mechanisms to inform flood response
Indicative timescale	Medium
Indicative cost	Medium
Related objectives	1, 3, 4
Funding option(s)	WG Revenue Grant, MTCBC Revenue
Delivery partners	Consultants
Type(s) of flood management	Preparedness

Measure #7	Groundwater
Description	Groundwater flooding occurs when the level of water within the ground (the water table) rises up and reaches ground level. There can be a significant delay between periods of heavy rain and resulting groundwater flooding. Groundwater poses a more pronounced risk to underground structures and rooms such as basements.
	There is currently limited communication with the public regarding the responsibilities around groundwater flood risk and techniques for managing this source of flooding. We propose to include better information on groundwater as part of our communications detailed in measure 9. Our survey indicate that groundwater was the source of flooding of highest concern for 36% of respondents.
	Whilst mining was active in Merthyr Tydfil many mines pumped out water to artificially lower groundwater levels and artificial drainage routes were created. Since mining ceased the groundwater levels in and around the mine workings are recovering to their pre-mining level. This can result in very shallow or perched groundwater within abandoned mine workings and surrounding areas.
	There is very limited information on groundwater in South Wales and in particular the groundwater risks in coalfield areas. MTCBC proposed to increase knowledge on the risks of groundwater flooding through communications, investigations and studies. We will aim to improve the provision of information available to developers to reduce the likelihood of new homes being built in areas of groundwater risk without appropriate drainage. Pioneering work was carried out by the Environment Agency and The Coal Authority in North East England to develop Mining and groundwater constraints categories for development with regard to drainage and SuDS ¹⁶ . This work can used for reference.
	The majority of major landslides in the borough have been associated with raised groundwater levels leading to slope instabilities. As part of part of increasing our understanding of groundwater issues we propose to study its role in landslides and improve our ability to highlight areas of risk.
Benefits incl.	Increased understanding of groundwater flood risk
multiple/wider benefits	 Better awareness and management of groundwater for new developments Develop knowledge of mining and groundwater interactions which are specifically applicable to MTCBC. Develop knowledge of landslide risk
	 Develop knowledge of landslide risk

Indicative timescale	Long
Indicative cost	Medium
Related objectives	1, 2, 3
Funding option(s)	Revenue
Delivery partners	LPA, MTCBC IT
Type(s) of flood	Prevention
management	

Measure #8	Historical Flooding
Description	Records of historic flood event help us to identify areas susceptible to flooding and interrogate patterns in historic data. This information is vital to determining the level of flood risk across the borough and to 'ground truth' flood risk model outputs. More complete historic flood data allows us to determine the extent and potential mechanisms/ cause of flooding.
	Records of flooding in Merthyr are distributed across a number of sources and databases. Many of these records are not digitised. MTCBC will build a GIS based database of historic flooding aggregated from local sources and other RMAs. This will support the identification of flood alleviation schemes and help to improve our understanding of flood risk in the Borough.
Benefits incl.	Historic flood data for Merthyr Tydfil in one database for easy access and use in analysis
benefits	Better targeting of flood alleviation schemes
	 Improved partnership between emergency services and MTCBC
Indicative timescale	Medium
Indicative cost	Low
Related objectives	1, 3
Funding option(s)	Revenue
Delivery partners	SWFRS, South Wales Police, MTCBC Data Protection, MTCBC IT
Type(s) of flood	Preparedness, Review
management	

Measure #9	Flood Awareness and Education
Description	 The Council has a duty under the Civil Contingencies Act (2004) to warn and inform its residents of risks before, during and after an incident. Despite previous engagement activity by councils, Welsh Government and other RMAs, the level of public awareness of flood risk remains low. A range of communication techniques, from social media to flyers and in-person events, will be used to ensure that all groups within the community are reached The following activities will be used to improve flood awareness and education: Presentations in schools Community drop-in events Increased community engagement during development and construction of flood defence projects
	 Refresher sessions for the community during extended periods between major flooding incidents Training for MTCBC staff on flood risk and climate change
Benefits incl. multiple/wider benefits	 A more informed community is able to respond better to a flood emergency Increased awareness leads to residents and businesses being better prepared for the impacts of flooding A better educated population is less likely to engage in activities that would increase their risk of flooding (such as property alterations and not maintaining riparian assets)
Indicative timescale	Medium
Indicative cost	Medium
Related objectives	2, 3
Funding option(s)	WG Revenue Grant, MTCBC Revenue
Delivery partners	MTCBC Emergency Planning, MTCBC Corporate Communications, NRW
Type(s) of flood	Protection, Preparedness & Recovery
management	

Outreach, Awareness and Engagement

Measure #10	Flood Risk Responsibilities
Description	Many residents of Merthyr Tydfil are not aware or unsure of different RMA's responsibilities when it comes to flooding. In addition 62% of survey respondents who had a watercourse or culvert routed through or alongside their land were unaware of their riparian duties.
	In a number of past flooding events the scenario has been exasperated by riparian responsibilities not being carried out at all or to an adequate standard.
	The council will continue to engage with riparian owners of high risk assets and will reassess the identification of these owners following asset risk assessment exercises undertaken as part of this strategy development.
	As part of awareness and education activities outlined in Measure 9, there will be information on flood risk responsibilities including the Council's, the publics and other RMAs. See Section 5 for details of flood risk responsibilities.
Benefits incl. multiple/wider benefits	 Reduced flood risk from assets under riparian ownership Increased engagement with flood risk responsibility and increased stewardship in local communities Increased property level resilience and resistance leading to reduced risk
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Indicative timescale	Medium
Indicative cost	Low
Related objectives	2,3
Funding option(s)	WG Revenue Grant
Delivery partners	MTCBC GIS, MTCBC Corporate Communications
Type(s) of flood management	Prevention, Protection, Preparedness

Measure #11	Partnership Working
Description	Partnership working is important for RMAs working towards shared goals and lends itself well to flood risk management. It builds co-operation and provides an effective platform for information sharing and shared working. Working in partnership is also critical from a funding perspective as it increases cost-effectiveness and forms a key part of Welsh Government FCERM pipeline funding applications.
	MTCBC are an active member of The South East Wales Flood Risk Management Group (SEWFRMG) and will continue to participate and share best practice.
	NRW have piloted a Merthyr Catchment Partnership to bring RMAs together with a geographical focus to develop and deliver projects with multiple benefits. MTCBC took part in the pilot and will continue to engage with the partnership as it is rolled out by NRW more formally. It demonstrates best practice and will support the development of NFM projects in line with measure 17.
	MTCBC are working with DCWW on a scheme targeted at reducing surface water entering sewers that outfall at the Trelewis Glynbargoed Road CSO. MTCBC will continue to support DCWW as they develop similar schemes across the Borough.
	MTCBC will work with NRW who propose to use partnership working to develop a Strategic Flood Masterplan, a holistic long term flood risk management strategy, for the River Taff Catchment.
Benefits incl.	Collaboration means less resources per RMA are required to deliver a project
multiple/wider	Improved information sharing and networking
benefits	 Potential to deliver innovative projects with multiple benefits for a range of stakeholders
Indicative timescale	Long
Indicative cost	Medium
Related objectives	1, 2, 3
Funding option(s)	NRW, DCWW, Revenue
Delivery partners	MTCBC Planning, MTCBC Countryside, NRW, SWTRA, Carmarthenshire Council, RCTCBC,
	Cardiff, Powys Council, Bannau Brycheiniog NPA, DCWW, Cardiff Council, MTCBC Active Travel
Type(s) of flood	Prevention, Preparedness
management	

Measure #12	Flood Response Plan
Description	The MTCBC Emergency Response Flood Plan is the primary plan for the Council's response to flooding specifically and it should be used in conjunction with the MTCBC Major Incident Plan and The South Wales LRF Flood Arrangements.
	As a Category 1 Responder under the Civil Contingencies Act 2004 Merthyr Tydfil County Borough Council (the Council), has to recognise its responsibilities to all its communities when they suffer disruption which affects their social and economic wellbeing. The Council is fully committed to its community leadership role in assisting members of the public to react to and cope with these disruptions. Implicate to the Community Leadership role is the identifications of and partnership working with other concerned or involved agencies.
	Following severe flooding in 2020 it is proposed that The MTCBC Emergency Response Flood Plan is reviewed annually to ensure that information is current and accurate. To increase awareness of the Emergency Response Flood Plan internally it is proposed that Local Authority periodically arranges a simulated flood response event. This will help staff to be aware and confident in their roles for emergency response and assist with reviewing the Emergency Response Flood Plan.
Benefits incl. multiple/wider benefits	 Effective and coordinated response to flooding Improved awareness of effective and prolonged flood response Regular and structured communication with partners in relation to flood response
Indicative timescale	Long
Indicative cost	Low
Related objectives	2, 4
Funding option(s)	Revenue
Delivery partners	MTCBC Emergency Planning, MTCBC Highways, NRW, DCWW, South Wales Police Force, SWFRS, SWTRA, Welsh Ambulance Service
Type(s) of flood management	Preparedness, Recovery

Measure #13	Community Resilience
Description	Community resilience is an important element of flood risk management and recovery. It complements other larger scale flood management techniques and is particularly important in areas where there is residual flood risk or where flood defences are not present. A resilient community is well prepared for flooding and can recover quickly in the event of a flood. Knowing what to do before and during a flood is critical to this and therefore MTCBC will support raising awareness. There a number of methods available to improve preparedness including community and individual flood plans; education events or workshops with residents, local businesses and schools; and webpages or flyers.
	Property Flood Resilience (PFR) measures are a key part of community resilience. They aim to reduce the ingress of floodwater to a property or minimise the impacts and aid rapid recovery if water does get in to the property. MTCBC will provide more information to residents on PFR through the website and community engagement.

Benefits incl. multiple/wider benefits	 Potential to reduce flood risk in areas where defences are not possible Increased community knowledge of resilience and how to recover from flooding Raises awareness of flood risk responsibilities
Indicative timescale	Medium
Indicative cost	Low
Related objectives	2, 3, 4
Funding option(s)	Revenue
Delivery partners	NRW, MTCBC IT
Type(s) of flood management	Protection

Measure #14	Holistic Flood Response and Recovery
Description	Studies show that the mental health impacts of flooding are even more common than physical health impacts ¹⁷ . Flooding can also worsen mental health impacts through the damage of community relationships due to dislocation and disputes surrounding recovery.
	Increasing the preparedness of communities for flooding is vital to improving recovery. This can be achieved through community resilience (measure #12), awareness and education (measure #2).
	MTCBC needs to be equipped to deal with the mental health impacts of flooding in order to support effective and enduring recovery from flooding.
	We propose to encourage first responders from MTCBC to work with Psychological Department colleagues in RCT to provide psychological first aid ¹⁸ during severe flooding so that we can provide the most effective response possible. We will endeavour to work with the Health Board and other RMAs towards offering a check-in support service.
	Information on available financial support and insurance (e.g. FloodRE ¹⁹) following flooding will be made available on the MTCBC LLFA webpages. This will be an important resource and consideration for local businesses.
Benefits incl.	Reduction in mental ill health caused by flooding
multiple/wider	Maintained community cohesion through reducing the distress caused by flooding
benefits	 A more holistic and comprehensive approach to flood recovery for residents and businesses.
Indicative timescale	Long
Indicative cost	Medium
Related objectives	4
Funding option(s)	Potential external funding, Revenue
Delivery partners	Health board, MTCBC Emergency Planning, Social Services
Type(s) of flood	Recovery
management	

Measure #15	Investigating Flood Events
Description	Under Section 19 of the Flood and Water Management Act 2010, LLFAs are required to investigate flooding that they become aware of to the extent considered necessary or appropriate. The results of the investigation must be published and will include which risk management authorities had relevant flood risk management functions and whether they have exercised those functions appropriately in response to the flood.
	There is no threshold for Section 19 reporting in statute so an expectation has been set by Welsh Government that Section 19 reports are to be undertaken where 20 or more homes in one area experience internal flooding. MTCBC will endeavour to complete Section 19 reports within 3 months of the flood event.
	As the LLFA, MTCBC will investigate all flooding incidents that they are aware of occurring within the borough and record internally in line with measure 16. This record will include extent and source of flooding where possible.
Benefits incl.	Improve understanding of flood risk in MTCBC
multiple/wider benefits	 Ensure smaller flooding event data is captured and can be used to inform interventions and funding bids
	• Section 19 reporting assesses effectiveness of other RMAs and keeps their flood
	response practices accountable
Indicative timescale	Short
Indicative cost	Low
Related objectives	1, 3, 4
Funding option(s)	Statutory, Revenue
Delivery partners	MTCBC Engineering
Type(s) of flood	Review
management	

Measure #16	Recording of flood events
Description	Complete an accurate record of all scales of flooding provide a valuable resource for understanding flood risk across the Borough.
	We propose to develop an internal system for recording any scale and source of flooding.
	Ensuring that it is easy to record an event and that this can be done by any necessary council department.
Benefits incl.	 Improved flood history knowledge and therefore understanding of risk
multiple/wider	Better internal communication regarding flood response and recording
benefits	Digital records
	 Increased ability to direct funding to high risk communities
Indicative timescale	Medium
Indicative cost	Low
Related objectives	1, 4
Funding option(s)	Revenue
Delivery partners	MTCBC IT, MTCBC Emergency Planning, MTCBC Data Protection, MTCBC Customer Service,
	MTCBC Corporate Communications
Type(s) of flood	Review and Preparedness
management	

Measure #17	Natural Flood Management (NFM)
Description	NFM includes a range of measures that can be used to reduce flood risk by working across the landscape to mimic natural hydrological processes. Examples include leaky barriers, woodland management, runoff storage (e.g. ponds and wetlands) and river channel restoration. It complements other flood risk management techniques, can be used in both urban and rural settings and as individual measures or a number of complimentary measures together.
	NFM will be considered as an option for all flood management schemes proposed by the Local Authority. Following catchment analysis undertaken as part of this Strategy, areas with good potential for NFM have been highlighted and will be scoped and developed as projects during this strategy cycle. Given the more rural setting of many NFM measures, it will be ensured that proposed projects do not cause any detriment to important geodiversity sites.
	We will work with MTCBC Countryside and Energy teams to ensure that NFM schemes deliver multiple benefits in terms of flood risk management, climate change mitigation, access for the community and ecological benefit including water quality. The LLFA will also work with these teams to encourage the incorporation of NFM in ecology and land management led projects. This will support the requirement for net benefits for biodiversity as outlined in Planning Policy Wales
Benefits incl.	Reduction in surface water flood risk
multiple/wider	 Ecological enhancement and increased biodiversity
benefits	 Improvements and restoration of poor quality land
	Amenity benefit for local communities
Indicative timescale	Medium
Indicative cost	Low
Related objectives	3
Funding option(s)	NFM Grant, LPfN Challenge Funding, Revenue
Delivery partners	MTCBC Countryside Team, MTCBC Engineering
Type(s) of flood	Prevention
management	

Land and Environmental Management

Measure #18	Mineral Extraction
Description	The history and landscape of Merthyr Tydfil is synonymous with iron and coal mining. This has created a legacy of drainage challenges and historic assets that require management to reduce associated flood risk.
	The Council has delivered a number of schemes to improve the drainage from coal tips and reduce the downstream flood risk from these tips. We intend to continue delivering these schemes and propose to ensure that land drainage and flood risk engineers have input on all schemes so that the flood risk benefit can be maximised. Natural flood risk management techniques will be considered as complimentary measures where appropriate.
	There are hundreds of adits associated with abandoned mine working across Merthyr Tydfil. Many were used for drainage purposes and have since been buried. With rising groundwater levels, some adits present a flood risk for areas downstream. We propose to improve our knowledge of the interaction of groundwater and adits and to work with the Coal Authority to deliver schemes where adits are causing flood risk issues. Water quality implications of water from abandoned mines will be considered and the potential for schemes that

	Ffos-y-Fran open cast coal mine has been a dominant feature in Merthyr since extraction began in 2007. Enforcement notices have been issued and extraction will cease in November 2023. There are a number of flood risk assets on the site including ponds, channels and ditches. The council's flood risk team will be a part of the working group involved in the discussions around the restoration of the mine site. The minimising of flood risk from the site will be a priority.
Benefits incl. multiple/wider benefits	 Reduction in flood risk from historic mining assets Joined up working between the management of coal tips and the reduction of flood risk Increased awareness of mining legacy issues A proactive approach to managing flood risk from mining remediation
Indicative timescale	Long
Indicative cost	High
Related objectives	1, 2, 3
Funding option(s)	Coal tip grants
Delivery partners	Coal Authority
Type(s) of flood	Prevention
management	

Measure #19	Flood Risk and Climate Change
Description	Over the last decade there has been an increase in intensity and frequency of rainfall across the UK. The latest UK climate projections indicate that there will be wetter winters and drier summers but when rainfall does occur in summer it will be more intense ²⁰ . This is likely to increase the frequency and severity of surface water flooding. Longer wetter periods will lead to higher river levels and an increased likelihood of flooding.
	All flood risk management projects delivered by the LLFA will consider climate change allowances. The extent and height of some flood defences can be increased to account for future climate change. However, in some cases it will not be possible to build continually higher defences (resistance) and an adaptive approach may be necessary (adaptation). In extreme cases in the future, approaches such as relocation of some existing communities may need to be considered to manage the impacts of climate change.
	There is currently limited information and education for the public on the impacts of climate change in relation to flood risk. We propose to include climate change and adaptation in our flood risk education (Measure 9) to support communities to plan for the future. MTCBC's awareness of flood risk and climate change will be increased through workshops from other RMAs (e.g. NRW) followed by internal dissemination.
Benefits incl. multiple/wider	 A proactive approach to the impacts of climate change allows for adaptation and community resilience
benefits	 Better education empowers communities and provides MTCBC with the tools to respond to climate change more effectively and sympathetically
	 Tackling a range of climate change impacts supports the use of Natural Flood Management techniques which can offer a range of multiple benefits
Indicative timescale	Long
Indicative cost	Low
Related objectives	1, 2, 3
Funding option(s)	Grants, Revenue
Delivery partners	MTCBC Energy, MTCBC Planning
Type(s) of flood	Preparedness
management	

Measure #20	Flood Risk Management Schemes
Description	With a rapidly changing climate, a number of approaches are required to manage flooding including resilience and resistance. Flood risk management schemes may include improvements to highway drainage, improvements to ordinary watercourses, culvert improvements, construction of flood bunds and flood storage areas amongst other interventions.
	In some cases hard-engineered flood defence schemes may be the best option to protect homes and businesses, and can be used effectively in combination with other management approaches. Where hard engineering schemes are required MTCBC will endeavour to develop schemes that cause no detriment to the natural and historic environment, and townscape.
	We propose to develop a programme of flood risk management schemes to target the communities at highest risk and set out how these schemes will be delivered over this strategy cycle.
Benefits incl. multiple/wider benefits	 Reducing flood risk to those at highest risk Potential to provide protection to areas important to nature and culture such as SSSIs and Scheduled Ancient Monuments Potential to provide protection to infrastructure and essential services
Indicative timescale	Long
Indicative cost	High
Related objectives	3
Funding option(s)	FCERM Pipeline, Resilient Roads
Delivery partners	MTCBC Engineering, MTCBC Highways
Type(s) of flood management	Protection

Asset Management and Maintenance

Measure #21	Flood Risk Asset Register and Record
Description	Under Section 21 of the Flood and Water Management Act, Lead Local Flood Authorities are required to maintain a register and record of all structures and features that are anticipated to have a significant effect on flood risk in the area. The asset register is for public use and the asset record is for use by RMAs.
	There is no formal method for identifying assets that have a 'significant effect' so the Council will use flood history, vulnerability and flood modelling where appropriate to determine these assets. The asset record will continue to be expanded and MTCBC will utilise its role in flood risk investigation, SAB application assessments, Planning and Ordinary Watercourse Consenting to identify new assets proactively.
	MTCBC currently has a GIS based asset database which is to be reviewed and improved allowing scope for improved asset recording, inspections and flooding incidents.
Benefits incl.	These records can support the delivery of more targeted and efficient
multiple/wider	maintenance
benefits	Better identification of assets for internal projects and queries from other RMAs
	•
Indicative timescale	Medium
Indicative cost	Medium
Related objectives	1, 3, 4
Funding option(s)	WG Revenue Grant, MTCBC Revenue

Delivery partners	N/A
Type(s) of flood	Preparedness
management	

Measure #22	Flood Asset Maintenance
Description	Maintenance of flood risk assets is a key part of flood risk reduction. Numerous flooding incidents are caused by blockages to intakes and channels or highway drainage systems. A robust maintenance regime can help to reduce risk from blockages and extend the lifetime of flood risk assets.
	Modern software solutions provide opportunities for more proactive maintenance schedules. These options will be considered over the next strategy period. As an example, MTCBC Highways have recently adopted 'Causeway Alloy' software which allows for more efficient and targeted maintenance compared with previous systems.
Benefits incl.	Extended lifetime of flood risk assets
multiple/wider	 Reduced flood risk from high risk intakes and channels
benefits	 Improved amenity benefit of well-maintained green assets such as raingardens
	and watercourses
Indicative timescale	Medium
Indicative cost	High
Related objectives	2, 3
Funding option(s)	MTCBC Capital and Revenue
Delivery partners	MTCBC Highways
Type(s) of flood	Prevention
management	



11. FLOOD ACTIONS

11.1 INTRODUCTION TO FLOOD ACTIONS

The Flood Risk Regulations (2009) placed a duty on Lead Local Flood Authorities (LLFAs) to prepare Flood Risk Management Plans (FRMPs) for flood risk areas within their administrative boundary. The FRMP had to include objectives and measures to manage the identified flood risk and propose timings and implementation details for these measures.

Due to the revocation of the Flood Risk Regulations (2009) the new Local Strategy combines the FRMP and the Local Flood Risk Management Strategy into one document and will therefore supersede MTCBC's previous FRMP published in 2015.

Flood actions that meet the requirements of an FRMP will be provided as part of this strategy. The actions will detail how the Measures and Objectives outlined in Sections 10 and 7 will be delivered. The actions are specific tasks, activities or initiatives to be delivered within a short (1-3 years), medium (4-6 years) or long (6-10 years) term.

11.2 OUR FLOOD ACTION PLAN

MTCBC's Flood Action Plan has been organised based on the measures in Section 9 that the actions are designed to deliver. FRMP action plans are often organised by flood risk areas, but at this stage a number of the actions are applicable to all analysis areas making this structure less clear. A location column has been provided to indicate when certain actions will be targeted at specific areas.

The action plan will be tracked and updated periodically using the progress column as a 'live' record of delivery against the Local Strategy Measures to ensure that the actions are up to date and to enable the plan to evolve with time so that Measures can be delivered to their greatest extent. It is envisioned that as time progresses and the action plan is reviewed it will become more location specific. Investigation and research actions which dominate the short term will be completed and will enable the addition of actions for the delivery of a multitude of location specific schemes based on the findings.

An estimated cost column has been provided to assist with prioritising actions and seeking funding. These costs have been determined through analogous estimating based on the delivery of similar schemes, where available. An average rate of £30 per hour has been used where staff time is estimated. The comments column indicates when only part of the cost have been provided. This method is deemed appropriate for very early stage rough estimates but as delivery of the actions progresses, cost will be re-evaluated through project management and business cases where necessary.

MTCBC's Flood Action plan is provided within **Appendix A** of this strategy document and an up to date version will be maintained on the Council's website.

12. ENVIRONMENTAL ASSESSMENTS

Environmental assessments have been undertaken alongside the development of this Local Flood Risk Management Strategy to ensure the Objectives, Measures and Actions presented, take into account the environment within the local authority area, including important designations.

12.1 STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

A Strategic Environmental Assessment (SEA) is a way of assessing and monitoring the likely effects (positive and negative) of plans, programmes and strategies on the environment. It applies at the level of the plan or strategy (i.e. Local Strategy) which sets the direction for future development projects.

An SEA is a legal requirement to accompany a Local Strategy. Such assessments help to enable informed and transparent decision-making for the benefit of plan makers and the wider community in Wales.

The SEA was developed alongside this Local Strategy and is contained within a separate report.

Table 8 provides a summary of the assessment of LFRMS measures against SEA objectives.

SEA Objective	Summary
SEA1: Population, Equalities & Human Health	SEA1 has resulted in a number of minor positive effects. These effects are generally attributed to the support and protection of the health and wellbeing of the boroughs current and future demographics, with measures focusing of reducing flood risk in high risk areas, engaging and educating the local communities on flood risk and implementing schemes to reduce the risk of floods such as SuDS, culvert maintenance schemes and improved responses to flooding.
	Measures 1 and 6 specifically ensure future developments are directed away from flood risk areas.
	In addition, there is the potential for minor negative impacts on the health and wellbeing of future populations if flood defences are no longer reliable.
SEA2: Economy	SEA2 has resulted in a number of minor positive effects. This is generally due to measures that aim to increase understanding of flood risk (Measure 5) to improving warning systems (Measure 3), and natural flood management schemes such as SuDS (Measure 2). When combined, these measure help business owners prepare for the event of flood, allowing them to protect their assets and reduce the damage caused by flooding.
	However, there is the potential for minor negative impacts on local businesses and the local economy if flood defences are no longer reliable.
SEA3: Biodiversity	Of the 22 measures, one significant positive and three minor positive effects have been identified on SEA3. These measures help protect and contribute to ecosystem functionality and present opportunities for biodiversity net gain.
	Measure 2 specifically aims to incorporate SuDS at proposed developments within MTCB.
	Uncertain effects have arisen where it is unclear how individual developments and flood risk management schemes plan to incorporate green infrastructure and biodiversity net gain as there is not enough detail provided.

SEA4: Landscape & Townscape	SEA4 has resulted in three minor positive effects. This is generally utilising Natural Flood Management schemes such as SuDS to protect and enhance the rural and urban environments within MTCB by reducing the risk of flooding.
	Uncertain effects have arisen in measures 1, 4 and 20 as it is uncertain how green infrastructure and landscaping will be implemented at individual developments in the future or how the design of monitoring stations and hard engineering will affect the townscape and landscape setting.
SEA5: Historic	18 of the measures resulted in negligible effects on SEA5
Environmnet	Uncertain effects were found in measures 4, 17, 19 and 20, as it is uncertain how the proposed flood risk management schemes will protect and enhance the historic environment. There is the potential of the deterioration and loss of heritage assets if NFM is poorly designed. More detail is needed for individual developments as the overall strategy of developing the flood risk management schemes is not yet known.
SEA6: Water Environment	Of the 22 measures, seven have resulted in minor positive effects on SEA6. This is generally due to measures that aim to incorporate SuDS and NFM which help reduce flooding and restore natural sediment processes.
	Uncertain effects have arisen in measures 7 (Groundwater) and 20, where it is not yet known how proposals may impact the quality of groundwater.
SEA7: Climate Resilience	Of the 22 measures, two have resulted in minor positive effects on SEA7. This is generally due to the natural settings of SuDS and their positive impact to the local climate. Additionally, the provision of flood risk modelling can assess against climate change impacts.
SEA8: Flood Risk	Out of all the SEA Objectives, only SEA8 has resulted in significant positive effects, specifically for measures 2 (SuDS Approval Body) and 4 (Flood Monitoring). Aims within these measures seek to reduce flood risk in high-risk areas, improved culvert maintenance, raise awareness and develop real time monitoring of flood risk.
	Uncertain effects have arisen where it is unclear what innovative projects will be delivered from partnership working and how this might improve the vulnerability of flood risk.
SEA9: Transport & Infrastructure	Of the 22 measures, five have resulted in minor positive effects on SEA9. This is generally attributed to measures focusing on reducing flood risk in high risk areas, engaging and educating the local communities on flood risk and implementing schemes to reduce the risk of floods such as SuDS, culvert maintenance schemes and improved responses to flooding.
	Uncertain effects have arisen where it is unclear how the proposed flood risk management schemes will help reduce the impacts of flooding on critical infrastructure.
SEA10: Geology & Soils	All except one measure has resulted in negligible effects on SEA10.
	A minor positive effect has been identified where measure 17 (Natural Flood Management) specifically aims to work MTCB countryside team to incorporate NFM in land management led projects.

Table 8 SEA Assessment of Measures

Table 9 provides a summary of mitigation and enhancement measures identified by the SEA. Due to the SEA being an iterative process adjustments to the Local Strategy have been made for mitigation/enhancement measures where the mechanism is stated as 'within the LFRMS'.

IIA Objective	Mitigation/ Enhancement	Mechanism
 SEA1: Population, equalities and health 	Communication should not be limited to social media. Measures should ensure that all groups are reached inclusively and in a timely manner. Consideration should be given to those who may not have access or the knowledge to access the internet and/or a smart phone.	Within the LFRMS
 SEA1: Population, equalities and health SEA2: Economy 	Best practice mitigation measures e.g., noise and air quality management, should be implemented to minimise effects during construction on the local population. Active engagement with the local community should be undertaken prior to the commencement of any construction activities.	Construction Environmental Management Plan (CEMP) Community Engagement Plan
 SEA1: Population, equalities and health SEA3: Biodiversity 	NFM solutions should present opportunities for new areas of green infrastructure and green space which can be accessed by the local community.	Within the LFRMS Scheme level design
• SEA3: Biodiversity	Schemes should incorporate the need for biodiversity net gain.	Within the LFRMS Scheme level design
• SEA3: Biodiversity	Scheme design should aim to minimise the environmental effects by 'designing to avoid' potential habitat features that may be of local, national and international importance. Habitat loss should be avoided, but where this can't be avoided, habitats will be reinstated upon completion of construction, and compensatory habitat should be considered to replace damaged or lost habitat.	Scheme level design CEMP Biodiversity Management Plan
 SEA4: Landscape & Townscape SEA5: Historic Environment 	Measures should incorporate Construction Industry Research and Information Association's (CIRIA) guidance on SuDS design to ensure high-quality design that will minimise the effects on the historic environment	Scheme level design
 SEA4: Landscape & Townscape 	Developments should be well-designed and screened to ensure that their effects on the local townscape, landscape and historic setting are minimised.	Scheme level design

IIA Objective	Mitigation/ Enhancement	Mechanism
SEA5: Historic Environment		
• SEA5: Historic Environment	Careful consideration should be given to the potential presence of heritage assets (particularly buried archaeology) when finalising proposals for pipeline routing. Where required, a programme of trial trenching and archaeological recording should be undertaken.	Archaeological/heritage surveys CEMP
• SEA6: Water Quality	Care should be taken during construction regarding the potential for contaminants such as silt, concrete or fuel oil to pollute water courses via surface run off. All construction activities should be undertaken in accordance with relevant best practice pollution prevention guidance. Pollution Incident Control Management Plans should be developed to limit adverse effects arising from pollution events.	CEMP Pollution Incident Control Management Plan
• SEA6: Water Quality	NFM should also avoid heavily modified channels.	Scheme level design/ optioneering
• SEA6: Water Quality	Schemes should be design and carefully located to try and avoid intrusive works such as piling which could mobilise contaminants	Scheme level design/ optioneering
 SEA7: Climate resilience and energy efficiency 	Schemes should incorporate sustainable design measures to reduce overall levels of embodied carbon. The use of renewables for the energy supply during construction and operation will be investigated, as well as the use of materials with lower embodied carbon.	Scheme level design
 SEA10: Geology and soils 	Schemes should be directed away from areas of valuable agricultural land and/or important geological sites.	Scheme level design

Table 9 SEA mitigation and enhancement measures against IIA objectives

12.2 HABITATS REGULATIONS ASSESSMENT (HRA)

A Habitats Regulations Assessment (HRA) considers the possible harm a project or plan could cause to certain specially protected sites, with the aim of ensuring damage to these sites is avoided.

Screening has demonstrated that there are no National Site Network (formerly Natura 2000) sites, namely Special Areas of Conservation (SAC) and Special Protection Areas (SPA) sites within Merthyr Tydfil county borough.

The HRA screening is contained within a separate report.

12.3 WATER FRAMEWORK DIRECTIVE (WFD) ASSESSMENT

The Water Framework Directive (WFD) imposes legal requirements to protect and improve the water environment (including our rivers, coasts, estuaries, lakes, ground waters and canals). The key objective of the WFD is reach 'good' status for water bodies for both chemical and ecological status.

The WFD is based on a river basin district approach and is reported on through river basin management plans (RBMP) every six years. Merthyr Tydfil County Borough falls within the Severn River Basin District which covers over 21,000km² in both England and Wales. The Severn Basin District is divided into a number of catchments with Merthyr Tydfil being situated in the 'South East Valleys' catchment.

Table 10 summaries how measures in this Strategy consider the Severn River Basin District RBMP and WFD objectives.

LFRMS Measure	Consideration of Severn RBMP and WFD
#1: Local Planning Authority (LPA)	By working closely with the LPA on policy development, we ensure that planning policy considers overlaps between policy drivers, flood risk and water quality. This helps meet the objectives of the Severn RBMP and WFD in the most effective way.
#2: SuDS Approval Body (SAB)	SAB promotes the use of sustainable drainage systems across the borough and ensures that water quality from new developments is well managed and prevents deterioration of water bodies.
#5: Understanding Flood Risk	A more holistic approach to catchment analysis will improve our understanding of ecological and water quality pressures in high risk catchments. This will help to guide interventions that deliver on multiple benefits.
#11: Partnership Working	Work with others to promote best practice and to develop schemes that protect and restore the water environment. Work with others on a catchment basis to help deliver the objectives of the Severn RBMP.
#17: Natural Flood Management (NFM)	Identify schemes that work with nature to deliver increased resilience to surface water flooding and create more resilient ecosystems.
#18: Mineral Extraction	Develop our knowledge of the interaction of groundwater and abandoned mine workings including flood risk and water quality impacts. Promote best practice when restoration opportunities arise.

Table 10 Consideration of Severn RBMP and WFD

13. MONITORING PROGRESS

13.1 HOW WE MEASURE PROGRESS

The primary method of measuring the progress of the Local Strategy will be via the Action Plan. Actions have been derived from the overarching objective and measures in this Strategy, therefore their delivery will provide a means of measuring progress across the Strategy.

Progress on actions will be measured by the delivery of the action and where appropriate, this will include cost and time metrics. For longer term actions, incremental milestones will be used as more tangible way to measure progress.

13.2 HOW REGULARLY WE MONITOR PROGRESS

The Local Strategy will be updated in line with the National Strategy which is due to be updated in 2030 unless major policy changes occur before that time.

The Action Plan element of the strategy will be monitored and updated periodically as a 'live' document available on the MTCBC website. A progress report will be completed for internal monitoring annually to accompany the update. 'RAG' status reporting will be used within the Action Plan and progress report to clearly and rapidly communicate progress. This report will be published on the MTCBC website.

In order to drive the delivery of actions, the LLFA will internally review progress quarterly. The LLFA will be responsible for monitoring the progress of actions to be delivered by other RMAs. Twice yearly reviews are proposed to track the progress of actions delivered by others.

14. GLOSSARY OF TERMS

Term/ Acronym	Definition
CaRR	Communities at Risk Register
ССВС	Caerphilly County Borough Council
CIL	Community Infrastructure Levy
CSO	Combined sewer overflow
DCWW	Dŵr Cymru Welsh Water
DWMP	Drainage and wastewater management plan
EA	Environment Agency
EU	European Union
FCERM	Flood and Coastal Erosion Risk Management
FEH	Flood Estimation Handbook
Fluvial	Relating to main river
FRA	Flood risk area
FRAW	Flood Risk Assessment Wales
FRMP	Flood Risk Management Plan
FWMA	Flood and Water Management Act
GI	Green Infrastructure
GIS	Geographic Information System
HRA	Habitat Regulations Assessment
LDP	Local Development Plan
LFRMS	Local Flood Risk Management Plan
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LPfN	Local Places for Nature
МТСВС	Merthyr Tydfil County Borough Council
NFM	Natural Flood Management
NHS	National Health Service
NPA	National Park Authority
NRD	National Receptors Dataset
NRW	Natural Resources Wales
Ofwat	The Water Services Regulation Authority
PFR	Property flood resilience
PFRA	Preliminary flood risk assessment
PPW	Planning Policy Wales
RAG	Red Amber Green project status reporting
RBMP	River basin management plan
Receptors	Entities that may be harmed such as people, property or habitats
Retrofit	to install in something previously constructed
RMA	Risk management authority
RCTCBC	Rhondda Cynon Taff County Borough Council
SAB	SuDS Approval Body
SAC	Special area of conservation
SEA	Strategic environmental assessment
SEWFRMG	South East Wales Flood Risk Management Group
SFCA	Strategic Flood Consequence Assessment
SPA	Special Protection Area

SPG	Supplementary Planning Guidance
SSSI	Site of Special Scientific Interest
SuDS	Sustainable drainage systems
SWFRS	South Wales Fire and Rescue Service
SWTRA	South Wales Trunk Road Agent
TAN15	Technical Advice Note 15
TfW	Transport for Wales
WFD	Water Framework Directive
WG	Welsh Government

15. APPENDIX A: ACTION PLAN

	Local Flood Risk Management Strategy Action Plan 2024												
Measure ID	Measure	Action ID	Priority	Action	Category	Location	Lead	Partner(s)	Timeframe	Estimated Cost	Funding Source	Progress	Comments
	1 Local Planning Authority (LPA)		Med	Develop an SPD on Flood Risk, SuDS and Open Space to accompany the new LDP	Management	Full Borough	LPA	LLFA, MTCBC Countryside	Medium	£4,500.00	MTCBC Revenue	Not Started	Cost = staff hours for duration of project
1	Local Planning Authority (LPA)	002	Med	Work with developers and LPA at masterplanning stage to improve integration of SuDS within development	Communication/ Awareness	Full Borough	LLFA	LPA	Medium	£3,600.00	MTCBC Revenue	Not Started	Cost = staff hours. 20hrs
2 SuDS Approval Body (SAB)	003	Med	Work with LPA on LDP update from an early stage	Statutory	Full Borough	MTCBC Planning	LLFA	Medium		MTCBC Revenue	Not Started	p.a. over o year cycle	
		004	High	Develop a maintenance programme for SuDS features adopted by MTCBC	Management	Full Borough	SAB		Short	ТВС	SAB Income	Not Started	
2	SuDS Approval Body (SAB)	005	High	Review links between SAB and LPA at planning application stage. Identify solution for early identification and patification of planning applications that require SAB	Investigation/ Research	Full Borough	LLFA	SAB, LPA	Short	£900.00	MTCBC Revenue	Not Started	Cost = staff hours for
		006	High	Improve flood warnings issued by the council making them available across a wider range of	Communication/ Awareness	Full Borough	MTCBC Corporate	LLFA, MTCBC Emergency	Medium	£1,050.00	MTCBC Revenue	Not Started	Cost = staff hours for
3	Warnings and Forecast		-	platforms. Research the use of social media to issue hazard alerts more effectively. Research Scalgo software to establish its applicability for work across the LLFA and projections issued are prodicting whether acrowulations during flock flooding and data to			Communications	Planning					Cost = staff hours to
		007	Low	support flood modelling. Determine the most cost effective licencing solution for this software.	Investigation/ Research	Full Borough	MTCBC Insurance	LLFA	Short	£300.00	MTCBC Revenue	Not Started	complete research. Software cost TBD
4	4 Flood Monitoring		High	Investigate and deliver a real-time culvert intake monitoring system. Consider the inclusion of CCTV where beneficial.	Investigation/ Research	Full Borough	LLFA		Short	£30,450.00	Flood risk grant	In progress	Cost for 12 monitors and 15 hours staff time to organise project
		009	Low	Expansion of culvert monitoring system based on assessment of high risk intakes identified under action 011	Management	Full Borough	LLFA		Long	£15,000.00	Flood risk grant	Not Started	Cost for 6 monitors
	5 Understanding Flood Risk	010	High	Carry out flood risk modelling to demonstrate reduction in risk provided by recent projects and submit updates via flood risk to NRW. Modelling completed in house where possible	Investigation/ Research	Troedyrhiw priority, Full Borough	LLFA	NRW Local Operations Team	Medium	£7,800.00	Flood risk grant	Not Started	Cost = 150 hours staff time to complete modelling + 3 years software licence
5		011	High	Conduct detailed analysis for high risk intakes and watercourses associated with past flooding events. Modelling completed in-house where possible. Where technicalities exceed internal expertise, consultants will be used.	Investigation/ Research	Full Borough	LLFA	NRW Local Operations Team	Long	£24,300.00	FCERM Pipeline	Not Started	Cost = 200 hrs staff time to complete modelling + 3 years software + consultant's fees
		012	High	Produce a record of hydrological modelling that has been commissioned across the borough. Create central repository for the modelling outputs where appropriate	Investigation/ Research	Full Borough	LLFA	MTCBC IT	Medium	£1,500.00	MTCBC Revenue	Not Started	Cost = 50 staff hours to complete action
6	Flood Modelling and Surveys	013	Med	Flood risk modelling training for LLFA staff to reduce reliance on consultants	Investigation/ Research	Full Borough	LLFA		Short	£1,150.00	Flood risk grant	Not Started	Cost = 1x training course
		014	Med	Upskill engineering staff in watercourse survey so that data for flood modelling an be gathered in-house	Investigation/ Research	Full Borough	LLFA	MTCBC Engineering	Medium	£10,500.00	Flood risk grant	Not Started	Cost = staff time to complete informal training + new levelling equip.
	7 Groundwater	015	Med	Incorporate groundwater into flood risk awareness material and improve information available on the council website	Communication/ Awareness	Full Borough	LLFA	MTCBC IT, MTCBC Corporate Communications	Short	£300.00	MTCBC Revenue	Not Started	Cost = staff hours to complete action
7 Ground		016	Low	Discuss the development a project on understanding groundwater risk across the borough. Outputs of the study to be used in the planning process	Investigation/ Research	Full Borough	LLFA	MTCBC Planning	Long	£1,500.00	MTCBC Revenue	Not Started	Cost = project outline and funding bid prep. Project cost to be confirmed at
		017	Med	Develop a project focussed on improving our knowledge on the interaction between groundwater and landslides	Investigation/ Research	Full Borough	LLFA	NRW	Long	£3,000.00	MTCBC Revenue, flood risk grant	Not Started	Cost = staff time to develop project. Consultant fees to be determined at tender stage
		018	Med	Set up a data sharing agreement with South Wales Fire Service for flood related call-out data. Replicate agreement with South Wales Police once SWFS is successfully	Communication/ Awareness	Full Borough	MTCBC Data Protection	SWFS, LLFA	Medium	£1,200.00	MTCBC Revenue	In progress	Cost = staff hours to complete action
8	8 Historical Flooding		Med	Maintain an asset register of historic flooding events across the borough from a range of data sets including staff interviews. fire service records and MTCBC historic paper records	Investigation/ Research	Full Borough	LLFA	MTCBC GIS, MTCBC IT	Medium	£2,700.00	MTCBC Revenue	Not Started	Cost = staff hours over 4 vears
		020	Med	Review past and current communication material on flood risk including MTCBC Emergency Planning flyers, LLFA webpages	Communication/ Awareness	Full Borough	LLFA	MTCBC Emergency Planning, MTCBC Corporate Communications	Short	£600.00	MTCBC Revenue	Not Started	Cost = staff hours to complete action
		021	High	Produce flyers for properties at high risk of flooding to raise awareness to educate residents about flood risk	Communication/ Awareness	Properties at 'High' risk of flooding from surface water and small watercourses	LLFA	MTCBC Emergency Planning	Short	£1,700.00	Flood risk grant	Not Started	Cost = staff hours to complete action
9	Flood Awareness and Education	022	Med	Develop and deliver workshops in high risk communities on flood risk awareness and 'what to do in a flood' in high risk communities. Include guidance on community and individual flood plans (Measure #12).	Communication/ Awareness	Initially: Town North, Town South, Morlais, Troedyrhiw, Pentrebach. Open to all residents	LLFA	MTCBC Emergency Planning, MTCBC Corporate Communications, NRW	Medium	£2,430.00	Flood risk grant	Not Started	Cost = staff hours to complete action
		023	Low	Get flood risk and SuDS included as part of the Merthyr Tydfil Schools' Climate Charter	Communication/ Awareness	Full Borough	LLFA	MTCBC School Planning & Improvement	Short	£1,500.00	MTCBC Revenue	Not Started	Cost = staff hours to complete action
		024	Med	Deliver flood risk education sessions in schools. Trial in schools at high risk of surface water flooding.	Communication/ Awareness	Troedyrhiw Primary, St Illtyd's Primary Dowlais	MTCBC School Planning & Improvement	LLFA, MTCBC Energy, MTCBC Emergency Planning, MTCBC Corporate Communications	Medium	£2,400.00	Flood risk grant	Not Started	Cost = staff hours to deliver trial
10	Flood Risk Responsibilities	025	Low	Develop database of addresses that have riparian ownership associated with high risk assets. Targeted communications on riparian responsibilities	Investigation/ Research	Full Borough	LLFA	MTCBC GIS, MTCBC Corporate Communications	Medium	£2,200.00	Flood risk grant	Not Started	Cost = staff hours to complete action
		026	Med	Input to DCWW project aimed at reducing surface water entering combined sewers that outfall to Trelewis Glynbargoed Rd CSO	Communication/ Awareness	Bargoed Taf	DCWW	LLFA	Short	£3,000.00	MTCBC Revenue/ DCWW	In progress	20 hours staff time p.a. over 5 years
		027	Low	Stakeholder in Cilfynydd treatment works expansion project	Communication/ Awareness	Full Borough	DCWW	LLFA	Long	ТВС	DCWW	Not Started	Time input required from MTCBC to be confirmed
		028	Med	Deliver an NFM scheme through a Catchment Partnership	Management	Morlais, Vaynor, Trelewis	NRW	LLFA, MTCBC Planning, MTCBC Countryside, NRW, SWTRA	Short	£2,400.00	MTCBC Revenue/NRW	In progress	40 hours MTCBC staff time p.a. over 2 years. Project cost covered by NRW
11	Partnership Working	029	Low	Input Nature Based Solutions for Water Management Task & Finish Group and support delivery of an NFM scheme in BBNP	Communication/ Awareness	Vaynor	DCWW	MTCBC LLFA, Carmarthenshire LLFA, RCTCBC, Cardiff, Powys, Bannau Brycheiniog NPA.	Medium	£3,000.00	MTCBC Revenue/ DCWW	In progress	20 hours MTCBC staff time p.a. over 5 years
"		030	Med	Stakeholder for the 'Taff Strategic Flood Masterplan' - attend workshops, provide data and technical advice	Communication/ Awareness	Full Borough	NRW	DCWW, RCT, MTCBC, Cardiff Council,	Long	£3,000.00	MTCBC Revenue/ NRW	In progress	20 hours MTCBC staff time p.a. over 5 years

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Measure ID	Measure	Action ID Priority		Action	Category	Location	Lead	Partner(s)	Timeframe	Estimated Cost	Funding Source	Progress	Comments
		031	High	Develop a flood risk reduction programme for the Glamorganshire Canal including maintenance and physical improvements	Investigation/ Research	Treharris, Aberfan, Troedyrhiw, Abercanaid	LLFA	DCWW, MTCBC Estates	Medium	£6,000.00	MTCBC Revenue/ DCWW	Not Started	40 hours MTCBC staff time p.a. over 5 years
		032	Med	Maintain the position of the LLFA as a consultee for Active Travel and Local Places for Nature projects at design stage to ensure benefits for flood risk are maximised	Management	Full Borough	MTCBC Active Travel, MTCBC Countryside	MTCBC Engineering, LLFA	Medium	£6,000.00	MTCBC Revenue, Active Travel Fund, Local Places for Nature Fund	In progress	40 hours MTCBC staff time p.a. plus project costs TBC
			High	Assist Emergency Planning with organising a simulated flood incident exercise to train MTCBC staff	Communication/ Awareness	Full Borough	MTCBC Emergency Planning	LLFA, MTCBC Engineering, Emergency Services, Parks, H&SC, Contact Centre, Leisure Trust	Short	£300.00	MTCBC Revenue	Not Started	Cost = staff hours to complete action
12 Flood Response Plan	Flood Response Plan	034	Low	Develop a video for the public with information on how to respond during a flood and the roles of RMAs in response.	Communication/ Awareness	Town North, Town South, Morlais, Troedyrhiw, Pentrebach	MTCBC Emergency Planning	MTCBC Corporate Communication, LLFA, Emergency Services	Medium	£5,250.00	MTCBC Revenue	Not Started	Cost = staff hours to complete action + fliming costs
		035	Med	Review the MTCBC Emergency Flood Response Plan Annually	Statutory	Full Borough	LLFA	MTCBC Emergency Planning	Long	£360.00	MTCBC Revenue	In progress	Cost = staff hours p.a.
13	Community Resilience	036	Med	Research opportunities for Property Flood Resilience delivery and consult with communities at high risk of flooding to gauge level of demand	Investigation/ Research	Properties at 'High' risk of flooding from surface water and small watercourses	LLFA	NRW	Medium	£900.00	MTCBC Revenue	Not Started	Cost to complete research. Programme development to be determined following research
			Med	Update webpages to include information on PFR and post-flooding insurance options	Communication/ Awareness	Full Borough	LLFA	MTCBC IT	Short	£450.00	MTCBC Revenue	Not Started	Cost = staff hours to complete action
14	Holistic Flood Response and Recovery	038	Med	Scope improvements to MTCBC's mental health response to flooding	Investigation/ Research	Full Borough	MTCBC Emergency Planning	LLFA, RCT, Cwm Taf Morgannwg Health Board	Medium	ТВС	твс	Not Started	
15	la se d'a stra d'a setta d'a servici	039	High	Undertake Section 19 reports for flooding where 20 or more homes in one area experience internal flooding	Statutory	Full Borough	LLFA		As Required	£8,000.00	Flood risk grant	In progress	As required. Cost = estimate per S19
15	Investigating Flood Events	040	High	Develop a template report for flood investigations to be used by the engineering team to increase quality and consistency of investigation feedback	Investigation/ Research	Full Borough	LLFA	MTCBC Engineering	Short	£900.00	MTCBC Revenue	Not Started	Cost = staff hours to
		041	High	Create database of flooding records from 'Lifeline control room' to improve historic flooding records. Maintain database so that any flood incidents recorded by Lifeline are sent to the LLFA.	Investigation/ Research	Full Borough	LLFA	MTCBC Emergency Planning	Medium	£900.00	MTCBC Revenue	Not Started	Cost = staff hours to create database. Additional maintenance hours required
16		042	Med	Collect data from 'Tascomi' system to create a record of historic and future flooding. Create a	Investigation/ Research	Full Borough	LLFA	MTCBC Data Protection,	Medium	£900.00	MTCBC Revenue	Not Started	Cost = staff hours to
	Recording of Flood Events	043	High	Develop an online form for recording flood events. The form will be available to all departments in MTCBC and will allow for consistent and timely recording of flood events.	Communication/ Awareness	Full Borough	LLFA	MTCBC Customer Service MTCBC IT, MTCBC Corporate Communications	Short	£600.00	MTCBC Revenue, Active Travel Fund, Local Places for Nature FundIn progress for Nature FundMTCBC RevenueNot StartedMTCBC RevenueNot StartedMTCBC RevenueIn progressMTCBC RevenueNot StartedMTCBC RevenueNot StartedMTCBC RevenueNot StartedMTCBC RevenueNot StartedFlood risk grantIn progressMTCBC RevenueNot StartedMTCBC RevenueIn progressMTCBC RevenueIn progressMTCBC Revenue/ flood risk grantNot StartedMTCBC Revenue/ flood risk grantIn progressMTCBC Revenue/ Energy budgetNot StartedMTCBC Revenue/ Energy budgetNot StartedMTCBC Revenue/ Energy budgetNot StartedMTCBC Revenue/ Energy budgetNot Started	Not Started	Complete action Cost = staff hours to complete action
		044	Med	Create database of flooding records from existing online forms on council webpages to improve historic flooding records. Maintain database so that any flood incidents recorded by online forms are sent to the LLFA.	Investigation/ Research	Full Borough	LLFA	MTCBC IT	Medium	£900.00 MTCBC Re £900.00 MTCBC Re £900.00 MTCBC Re £600.00 MTCBC Re £900.00 MTCBC Re £900.00 MTCBC Re £900.00 MTCBC Re £900.00 MTCBC Re £2,050.00 Flood risk gra £750.00 MTCBC Re	MTCBC Revenue	Not Started	Cost = staff hours to create database. Additional maintenance hours required
			Low	Formal NFM training for LLFA staff. Provide informal training for engineering and country staff	f Communication/ Awareness	Full Borough	LLFA	The River Restoration Centre/	Short	£2,050.00	Flood risk grant/ MTCBC	Not Started	Cost = training for 2x staff +
		046	Low	Produce guidelines for the engineering department on how NFM can be considered at	Communication/ Awareness	Full Borough	LLFA	MTCBC Engineering	Medium	£750.00	MTCBC Revenue	Not Started	Cost = staff hours to
17 (N	Natural Flood Management (NFM)	047	High	Produce a shortlist of areas across the borough that have good potential for NFM and could be used a pilot projects	Investigation/ Research	Focus areas: Morlais, Pentrebach, Treharris, Bargoed Taf	LLFA	MTCBC Countryside	Short	£600.00	MTCBC Revenue	In progress	complete action Cost = staff hours to complete action
		048	High	Produce a shortlist of areas within urbanised parts of the borough for the delivery of retrofit SuDS projects	Investigation/ Research	Focus areas: Town North, Town South, Morlais	LLFA	MTCBC Highways, MTCBC Countryside, DCWW	Short	£600.00	MTCBC Revenue	Not Started	Cost = staff hours to complete action
		049	Low	Develop a project focussed on improving our knowledge on the interaction between groundwater and abandoned mine adits	Investigation/ Research	Full Borough	LLFA	Coal Authority, NRW	Long	£3,000.00	MTCBC Revenue, flood risk grant	Not Started	cost = staff hours + consultant fees to be determined at tender stage
18	Mineral Extraction	050	High	Continue LLFA/Engineering representation on Ffos-y-Fran technical working group	Statutory	Morlais, Town	MTCBC Planning	LLFA, MSW, Groundwater	Short		MTCBC Revenue	In progress	
		051	High	Determine surface water and groundwater drainage regime at Ffos-y-Fran and introduce monitoring at known outfalls	Investigation/Research	Morlais, Town South, Pentrebach	NRW, MSW Consultants LLFA	HSE, Coal Authority, MSW	Short	N/A	NRW	In progress	
		052	Low	Run a seminar on impacts of climate change for MTCBC staff	Communication/ Awareness	Full Borough	MTCBC Energy	LLFA	Medium	£900.00	MTCBC Revenue/ Energy	Not Started	Cost = staff hours to complete action
		053	Med	Include flood risk in educational materials and public workshops	Communication/ Awareness	Full Borough	MTCBC Energy	LLFA	Medium	£1,050.00	MTCBC Revenue/ Energy budget	VesIn progressNot StartedNot StartedIn progressIn progressNot StartedNot StartedIn progressIn progressIn progressIn progressNot StartedNot StartedNot StartedIn progressIn progress<	Cost = staff hours to complete action
19 Flood Risk and Clima	Flood Risk and Climate Change	054	Low	Set up a climate change working group	Communication/ Awareness	Full Borough	MTCBC Energy	LLFA, MTCBC Countryside, MTCBC Planning, MTCBC Highways, MTCBC Property Services	Medium	£1,500.00	MTCBC Revenue/ Energy budget	Not Started	Cost = staff hours 10 hours MTCBC staff time p.a.
		055	Low	Collaborate with public health on the Cwm Taf Morgannwg climate change risk assessment to enusre flood risk is covered	Communication/ Awareness	Full Borough	Cwm Taf Morgannwg PSB	LLFA, MTCBC Energy	Short	£720.00	MTCBC Revenue	Not Started	Cost = staff hours 2 hours per month over 2 years
		056	High	Develop flood risk management schemes to help protect the most at risk communities	Investigation/ Research	Focus areas: Town North, Town South, Morlais, Troedyrhiw, Pentrebach	LLFA	MTCBC Engineering, NRW Local Operations Team	Short	To be determined at tender	FCERM Pipeline	Not Started	

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Measure ID	Measure	Action ID	Priority	Action	Category	Location	Lead	Partner(s)	Timeframe	Estimated Cost	Funding Source	Progress	Comments
20	Flood Risk Management Schemes	057	High	Deliver flood risk management schemes to help protect the most at risk communities	Management	Focus areas: Town North, Town South, Morlais, Troedyrhiw, Pentrebach	LLFA	MTCBC Engineering, NRW Local Operations Team	Long	To be determined at tender	FCERM Pipeline	Not Started	
		058	Med	Develop and deliver schemes to target existing highway flooding issues	Management	South, Merthyr	MTCBC Highways	LLFA	Medium	£7,500.00	Highways budget/ Resilient Roads	Not Started	Internal design costs for scheme developmet only (further cost TBD at tender)
21	Flood Risk Asset Register and	059	High	Introduce new flood asset register to record flood assets, adopted SAB assets and live recording of flood asset inspections and investigations. Report to NRW for inclusion in national flood asset database.	Statutory	Full Borough	LLFA		Medium	£38,000.00	MTCBC Revenue	Not Started Internal design costs for scheme developmet on (further cost TBD at tend) Not Started Cost = staff hours to complete action + cost new system In progress Cost = staff hours to complete action + cost new system Ongoing Operating	Cost = staff hours to complete action + cost of new system
	Record	060	Low	Compile condition information from recent culvert surveys to be added to asset register	be added to asset register Investigation/ Research North, Town South, LLFA MTCBC GIS Si	Short	£1,500.00	MTCBC Revenue	In progress	Cost = staff hours to complete action			
22	Flood Assot Maintonance	061	High	Continue regular maintenance programme for intakes, trash screens and channels to reduce risk of blockages	Statutory	Full Borough	LLFA	MTCBC Highways	Short		Land drainage budget	Ongoing	
	Flood Asset Maintenance	062	High	Continue regular maintenance programme for gullies and highway drainage to reduce risk of blockages	Statutory	Full Borough	MTCBC Highways	LLFA	Short		Highways budget	Ongoing	

16. APPENDIX B: CONSULTATION RESPONSES

Complete Issue/Comment	Source	LLFA Response	Resolution	Changes to which part Page of Strategy?	no.
Strategy too long	2 respondants to surve	y Noted, but all the information covered is required by WG. Ours is shorter than the majority of draft strategies seen to date.	Provision of Summary with published strategy. Ensure the summary is concise	Summary N/A	
Report not in plain English	Survey respondant	Noted, the Strategy is a technical document despite being public facing.	Review and reword any areas of the strategy that could be simplified. Ensure that the summary is very understandable	Main body; summary	
Active river management including realignment, hold water higher up in the catchment	Survey respondant	Agreed, this is covered in NFM related measures and actions.	N/A		
Lack of gully cleansing and watercourse maintenance	Survey respondant x3	Maintenance ambitions covered in measure 22	Speak to Highways about gully cleansing programme.		
Concern regarding focus on highest risk areas, should	Survey respondant	Noted, we will make it clearer that the high risk areas are a	Adjust wording in objectives section		
reduce risk to all		priority (and funding priority) but we will consider all risk			
Need to work with communities on coordination of	Survey respondant	Agreed, covered in Holistic flood repsonse, education and	N/A		
response		understanding flood risk measures			
Not satisfied with amount of info/measures regarding	Survey respondant	Addressed in measure 20. Managing the Taff is NRW's	Ensure new development in flood risk zones is	LPA measure #1	56
hard engineering and river flooding management.	, ,	responsibility.	addressed		
Raises issue of continued development on flood plains					
Lack of information on Landslides (Mountain above	Survey respondant	Noted. We will add more to the groundwater measure to help	Include in the groundwater measure.		
Diana St Troedyrhiw named as example)		address this and include an action to improve our knowledge of landslides			
Measures don't go far enough'	Survey respondant	Strategy has to be realistic and deliverable. We will build on the actions as things get delivered			
Concerns regarding financing, resourcing and delivery of the strategy	Survey respondant	For the new Local Strategy we have provided a costed action plan to highlight the level of funding required to achieve our objectives, this has been put before cabinet. As the action plan develops the costs will be updated. A progress report will be presented to committee/cabinet every year to ensure delivery and financial resourcing			
Further consideration of climate change through new TAN15	Survey respondant	Covered in measure #1 LPA	Make sure there's reference to TAN15.		67
The Corporate Asset Management Plan should be referenced as a relevant Strategic Document	Survey respondant	Noted. Check relevant section	Reference to this document added		
Consider formal public reporting on action plan to complement internal reviews	ССВС	We will make our action plan update process clearer. Online doc which is periodically updated	Word action plan section to match foreword. Consider including reporting to cabinet. Update monitoring section	Action Plan chapter, Section 13.2	69
The Flood Risk Regulations 2009 legislation was revoked as part of the Retained EU Legislation Act on the 31 December 2023.	NRW	Noted	Add this to legislative context		5
CaRR areas identified as most at risk of flooding from rivers and the sea in South Central Flood Risk Management Plan are 'Merthyr Tydfil and Troedyrhiw'	NRW	Noted	Slightly expand on the risk from rivers even though it's not our responsibility.	Section 8 - main rivers box	20
Please could the reference to NRW's website be updated to: Natural Resources Wales / Owning a watercourse	NRW	Yes	https://naturalresources.wales/flooding/owning-a- watercourse/?lang=en	References	75
Further information and advice is also available on our website for those at risk of flooding naturalresources.wales/flooding.	NRW	We'll add the reference	Add reference to further information that NRW provide	6.3 property and business owners	12

	10014				10
Merthyr Catchment Partnership and a Morlais Catchment Partnership	NRW	Noted	Check use of these phrases throughout	6.4 onwards	18
Reference Long Term Investment Requirements for	NRW	Noted	Add line about cost of raising defences from NRW	Section 8.2	25
				· · · · · ·	
3-4 years not accounted for in measures	NRW	Noted	Include 3-4 years in the medium range	Measures intro;	
No specific comments	The Coal Authority	N/A	N/A		
				' '	I
Do the cost of the actions relate to 12 months or 6	NRW	Plan to be amended to make this clearer	Add to comment column if it varies per item. Add to	Action Plan	
vears			column header if largely consistent		
Merthyr's working on a climate change risk assessment	NRW	Noted	Research this involvement and add action	Action Plan	
with Cwm Taf Morgannwg					
Flood risk assets should be sent to NRW for National	NRW/	Noted	Add this requirement to the action description		
flood asset database		Noted	Add this requirement to the action description		
Make sure NPW is undated to the relevant team		Wa'll undate where pessible	NPW/ > NPW/ Local Operations Team	Actions 10 E4 EE 11	
			NRW > NRW Local Operations reall	Actions 10, 54, 55, 11	
If he same it is as some and ad that the LEDNAC is shade the			Action Discussilling under a periodically and echanges		
If known, it is recommended that the LFRIVIS include the	WSP SEA	Not possible at this stage, Action Plan is as close as we can get	Action Plan will be update periodically and schemes		
indicative programme of flood risk management		to this currently	will be added once a programme is developed		
schemes and the types of schemes to be delivered.					
Overarching objectives are lacking in detail. Providing	WSP SEA	To be considered	Reiterate in objectives section that the detail is	7.2 Objectives in our	19
further details on what the objectives could entail			covered in the measures and sction plan	area	
would increase the overall compatibility.					
This measure could also be linked to Local Development	WSP SEA	Noted, already covered but will reinforce that part of the	Add more on LDP to the measure. Linked to point 8 in	measure #1	56
Plan to ensure that flood risk is a key consideration at		measure	this spreadsheet		
the strategic plan level					
recommended that the measure includes an insurance	WSP SEA	Noted, however the standard of SuDS design is governed by		measure #1	
of 'high quality design' to ensure that SuDS are well		the Welsh National standards which is what the SAB assesses	Repharase to mention historic environment if		
incorporated into the natural and historic environment		against.	possible		56
This measure should also make it clear as to whether it	WSP SEA			measure #2	
also includes rural SuDS as their management is slightly		SAB applies to all development over 100m2. Rural or urban is			
different to urban SuDS.		somewhat irrelevant here	No action required		57
This measure should also consider detailing other	WSP SEA	The measure mentions social media as it was suggested by		measure #3	
communication measures which may be used to reach		multiple respondants to our survey as a better way to			
those members of the community that may not have		communicate warnings. The measure does not imply that	Consider adding 'In addition to existing website and		
access to social media.		other methods will not be used.	telphone warnings		57
This measure could also include refresher workshops to	WSP SFA			measure #9	
ensure the community continue to be well informed			Add line on refresher workshops to measure. Check if		
and do not become complacent to the risk		Agreed	action also needs modifying		61
This measure could include further details on the types	Μ/SP SFA	The measures are high level and would not be suited to		measure #17	
of NEM proposed		naming types of proposals. NEM schemes will be developed			
of Milli proposed		through a number of routes including catchment partnerships			
		which will lead to a wide range of interventions	Add example types of NEM to the measure		60
Recommended that the 'relocation' element of the				moasuro 10	0.5
measure is detailed further as it is not optiroly clear	VVSP SEA				
whather this is the whole community and for applies to					
whether this is the whole community and/or applies to		Netod	Existing communities		67
Existing or proposed developments.		Noted NEM monouro #17 states that NEM will be seed to use			0/
The measure could also outline a criterion/ threshold as	WSP SEA	INOLEU. INFINI measure #17 states that INFINI WIII be considered		Nieasure 17	
to when hard engineering solutions would be		as an option for all flood management schemes proposed by			
considered e.g., after all NFM solutions have been		the local authority. I.e. would have to be ruled out before			
considered, the value/ importance of the asset that		hard engineering is conidered.	No action required		66

Recommended that the measure provides further	WSP SEA	This is a reference to amenity benefit provided by green		Measure 22		
details on what is meant by 'improved amenity benefit		features (NFM, SuDS, watercourses) which is well maintained	Change to 'amenity benefit of well maintained green			
of well-maintained assets'		can be enjoyed by the public	assets such as Raingardens and watercourses'		69	
Unclear how local businesses will be supported	WSP SEA	Noted	Highlight local businesses as part of a measure	Meausure 13 and 14		
	WSP SEA		Include biodiversity net gain within NFM measure and	Measure 17		
		Noted. Termed 'Net Benefit for Biodiversity' in Wales and was	stipulate minimal impacts on biodiversity in flood			
Biodiversity net gain is not mentioned		added to PPW in Oct 2023	defence measure		66	
Positives to Landscape and Townscape but no	WSP SEA		Consider which measures could highlight this - land	Measure 20		
detriment is not stressed enough		Noted	and environmental management section?		66	
	WSP SEA		Mention impact on historic settings in flood defence	Measure 20		
			measure. Consult with historic environment officer			
Strategy aims to introduce infrastructure that could			for projects in sensitive areas even if planning not			
adversely impact historic settings		Noted	required?		68	
It is also not clear if interventions which may come	WSP SEA		Note consideration of important geodiversity sites in			
forward would result in the loss of high quality		Noted. But there is no land classified as 'high quality	NFM measure as this is the dominant measure for			
agricultural land or geologically important sites.		agricultural' (grades 1 2 and 3) in MTCB.	land use	Measure 17	66	
NFM solutions should present opportunities for new	WSP SEA					
areas of green infrastructure and green space which can						
be accessed by the local community.		Noted	Add to NFM measure	Measure 17	66	
	WSP SEA		Add to Flood awareness and education measure. "A			
Communication should not be limited to social media.			range of communication techniques will be used to			
Measures should ensure that all groups are reached			ensure that all groups are reached, from social media			
inclusively and in a timely manner.		Noted	to flyers and in person events"	Measure 9	61	

- ¹ Corporate Well-being Plan 2023-2028 (merthyr.gov.uk)
- ² First Replacement Local Development Plan 2016-2031 | Merthyr Tydfil County Borough Council
- ³ Flood and Water Management Act 2010 (legislation.gov.uk)
- ⁴ Merthyr Tydfil nature recovery action plan 2019
- ⁵ Merthyr Tydfil County Borough Council Decarbonisation Plan 2023 2030
- ⁶ Emergency Plan | Merthyr Tydfil County Borough Council
- ⁷ Corporate Asset Management Plan 2023-2038 | Merthyr Tydfil County Borough Council
- ⁸ National Strategy for Flood and Coastal Erosion Risk Management in Wales | GOV.WALES
- ⁹ Natural Resources Wales / Flood risk management plan 2023 to 2029
- ¹⁰ Drainage and Wastewater Management Plan | Dŵr Cymru Welsh Water (dwrcymru.com)
- ¹¹ Natural Resources Wales | Owning a watercourse
- ¹² Natural Resources Wales | Flooding
- ¹³ Blue Pages
- ¹⁴ NRW's Long Term Investment Requirements for Flood Defences in Wales report
- ¹⁵ FCERM Business Case Guidance | Welsh Government
- ¹⁶ Mining and groundwater constraints for development | Coal Authority
- ¹⁷ Every time it rains: British Red Cross research on flooding in the UK
- ¹⁸ Flooding and health: advice for frontline responders | UK Health Security Agency

¹⁹ Flood Re

²⁰ UK and Global extreme events – Heavy rainfall and floods | Met Office