



FLOOD RISK MANAGEMENT PLAN (DECEMBER 2015)



A greener place
Man gwyrddach



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INTRODUCTION

Under The Flood Risk Regulations 2009 a responsibility was placed on Caerphilly County Borough Council to prepare a Flood Risk Management Plan.

The Flood Risk Management Plan gives an overview of the flood risk in Caerphilly County Borough Council and our high level objective for the next 6 years which states that we will:

“Reduce Flood Risk in every area where significant flood risk has been identified”

Detailed objectives are also given within the Flood Risk Management Plan together with a series of measures, which will ensure flood risk in the Caerphilly County Borough Council area will be addressed and reduced during the 6-year period before the plan is next reviewed.

Through the production of this plan and from the experience and knowledge of our engineering staff we have learned how to manage flood risk in an efficient and cost effective way. There are still many lessons to be learned and this first cycle of the Flood Risk Regulations will present many challenges in terms of providing solutions to reduce flood risk which will be acceptable within our communities and will also attract the appropriate funding from Welsh Government, Europe and other sources.

The Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Flooding from main river and reservoirs is still the responsibility of Natural Resources Wales and their proposals are contained within the Severn River Basin Flood Management Plan.

1. Purpose Of Flood Risk Management Plans In Managing Flood Risk

1.1. What is a Flood Risk Management Plan?

Flooding remains a key threat to communities across Wales, and managing this risk through careful planning is important to minimise the risk to communities. Flood risk management planning allows Lead Local Flood Authorities to develop a better understanding of risk from all sources of flooding and agree priorities to manage that risk.

The Flood Risk Management Plan has been developed with this in mind and sets out how Caerphilly County Borough Council will over the next 6 years, manage flooding so that the communities most at risk and the environment benefit the most. In doing so, this Flood Risk Management Plan takes forward the objectives and actions set out in our Local Flood Risk Management Strategy.

This Flood Risk Management Plan also aims to achieve some of the objectives set out in the Welsh Government's National Flood and Coastal Erosion Risk Management Strategy, which provides the national framework for flood and coastal erosion risk management in Wales through four overarching objectives:

- **Reducing the consequences** for individuals, communities, businesses and the environment from flooding and coastal erosion;
- **Raising awareness of and engaging people in the response** to flood and coastal erosion risk;
- **Providing an effective and sustained response** to flood and coastal erosion events;
- **Prioritising investment** in the most at risk communities.

1.2. What is included in this Flood Risk Management Plan?

The information contained in the Caerphilly County Borough Council Flood Risk Management Plan includes the components set out in the Flood Risk Regulations 2009 (see Appendix 5). Most of this information has been gathered and updated through this first cycle, and has been drawn from the findings of our Preliminary Flood Risk Assessment and the measures we have identified and set out in our Local Flood Risk Management Strategy.

This Flood Risk Management Plan sets out appropriate objectives for the management of flood risk within areas covered by the plan. The objectives focus on reducing the adverse consequences of flooding for human health, the environment, cultural heritage and economic activity.

To do so, this Flood Risk Management Plan highlights the areas most at risk from surface water, groundwater flooding, ordinary watercourses and the interface with main river flooding in the Caerphilly County Borough Council area. It draws on the conclusions from these risks and sets out the measures we will take over the next 6 years to mitigate these risks and make our communities more resilient.

Due to the nature of flooding and current funding situation, we have also looked at measures to reduce the likelihood of flooding using non-structural measures including raising awareness of flooding and better understanding of local flooding issues.

All the measures identified in this plan have been classed in 4 categories:

- Prevention;
- Protection;
- Preparedness;
- Recovery and Review.

1.3. Legislative Context.

Flood Risk Regulations 2009:

Under the Flood Risk Regulations 2009, Lead Local Flood Authorities are responsible for producing Flood Risk Management Plans for Flood Risk Areas that were identified in the Preliminary Flood Risk Assessments.

While Natural Resources Wales is responsible for producing Flood Risk Management Plans at a river basin district level for communities at risk of flooding from main rivers and the sea, Lead Local Flood Authorities are only required to produce local Flood Risk Management Plans to manage flooding from surface water, groundwater flooding, ordinary watercourses and the interface with main river flooding.

The regulations set out six-year cycle with timescales for reporting to the European Commission and the publication of 3 key outputs:

- Preliminary Flood Risk Assessment identifying Flood Risk Areas (published in 2011);
- Production of Flood Hazard and Flood Risk Maps for the Flood Risk Areas (published in 2013);
- Preparation of Flood Risk Management Plans for Flood Risk Areas.

We are currently in the first cycle of the Regulations and Flood Risk Management Plans represent the final output of this cycle and must be published by December 2015.

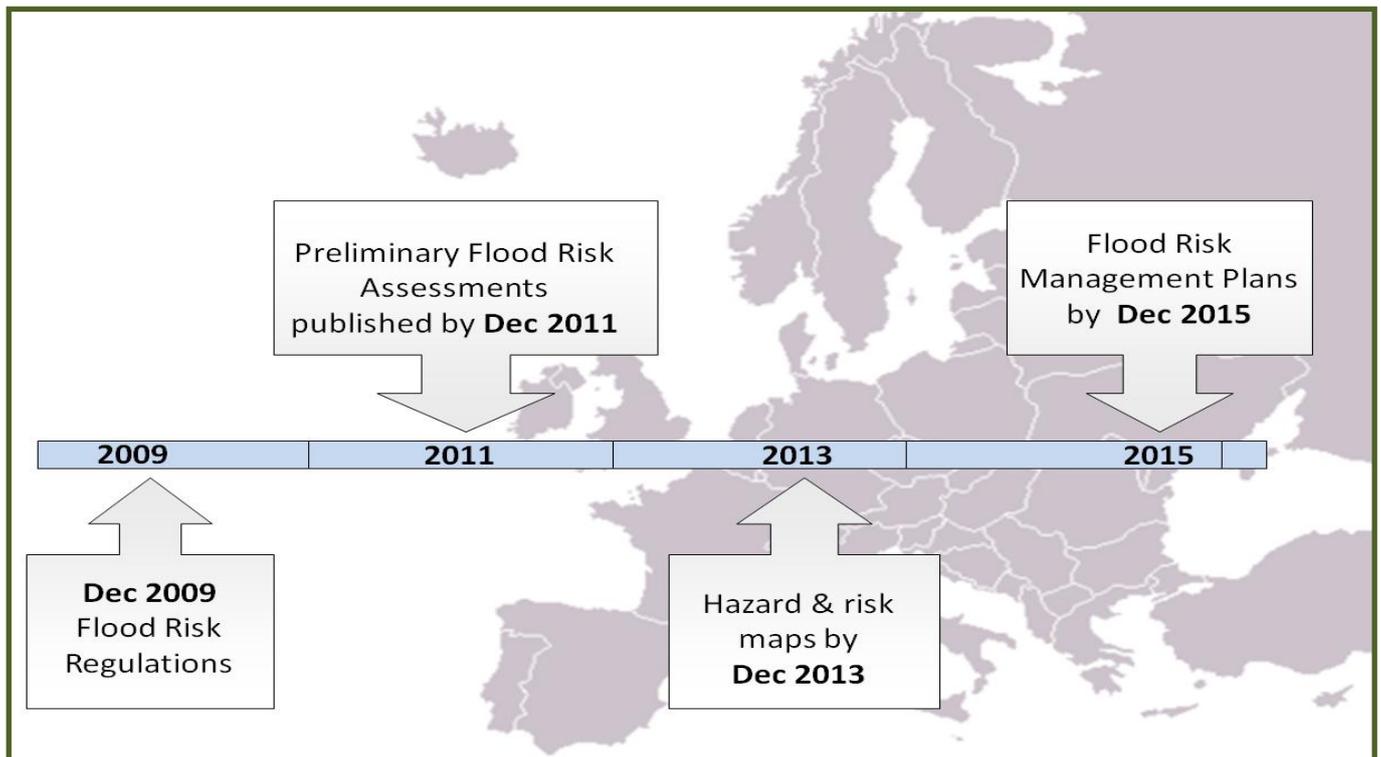


Figure 01: Flood Risk Regulations (2009) Timescale

Preliminary Flood Risk Assessment:

The Preliminary Flood Risk Assessment was a high level screening exercise that compiled information on significant local flood risk from past and future floods, based on readily available information. The scope of the Preliminary Flood Risk Assessment was to consider flooding from surface water runoff, groundwater and ordinary watercourses, and any interaction these sources have with main rivers with the aim of identifying flood risk areas as set out under the European Flood Directives.

Production of Flood Hazard and Flood Risk Maps for flood risk areas:

In 2013 the Environment Agency, working with Natural Resources Wales and Lead Local Flood Authorities produced the updated Flood Map for surface water.

The updated map represents a significant improvement on the previous surface water flood maps (2008 and 2010), both in terms of method and representation of the risk of flooding. The updated Flood Map for surface water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year:

- 1 in 30 (3%);
- 1 in 100 (1%);
- 1 in 1000 (0.1%).

The updated map also provides the following data for each flooding scenario:

- Extent;
- Depth;
- Velocity (including flow direction at maximum velocity);
- Hazard (as a function of depth and velocity).

It also includes information about the source of the data (i.e. whether it was from the nationally produced modelling or locally produced modelling) and the confidence in the data outputs.

Detailed maps for your area can be obtained using the following link:

<http://naturalresources.wales/our-evidence-and-reports/maps/?lang=en>

Flood Risk Management Plans for flood risk areas:

We are currently in the first cycle of the Regulations and Flood Risk Management Plans represent the final outputs of this cycle and must be published by December 2015.

Flood and Water Management Act:

The Flood and Water Management Act was introduced in April 2010 in England and Wales. It was intended to implement Sir Michael Pitt's recommendations following the widespread flooding in 2007. The act was also intended to clarify roles and responsibilities between Risk Management Authorities.

Under the Act, the Welsh Government was required to produce a National Strategy for Flood and Coastal Erosion Risk Management Strategy which was completed in January 2013.

Local Flood Risk Management Strategies were created to define who the Risk Management Authorities are, what their functions are and what their responsibilities are. Local Flood Risk Management Strategies underwent public consultation. Local Flood Risk Management Strategies must also be consistent with the National Strategy for Flood and Coastal Erosion Management.

Water Framework Directive:

The Water Framework Directive 2000 is a European Union Directive which commits member states to achieve good qualitative and quantitative status of all water bodies by 2015.

One of the requirements of the Water Framework Directive is that Natural Resources Wales and the Environment Agency must produce and update a River Basin Management Plan for each district. Caerphilly County Borough Council lies within the catchment for the River Severn and is included in the South East Valleys Catchment.

Objectives of the Directive

The Directive aims for 'good status' for all rivers, lakes, ground and surface waters in the European Union.

The ecological and chemical status of water bodies is assessed according to the following criteria:

- Biological quality (fish, benthic invertebrates, aquatic flora);
- Hydromorphological quality such as river bank structure, river continuity or substrate of the river bed;
- Physical-chemical quality such as temperature, oxygenation and nutrient conditions;
- Chemical quality that refers to environmental quality standards for river basin specific pollutants. These standards specify maximum concentrations for specific water pollutants. If even one such concentration is exceeded, the water body will not be classed as having a 'good ecological status'.

Consultation:

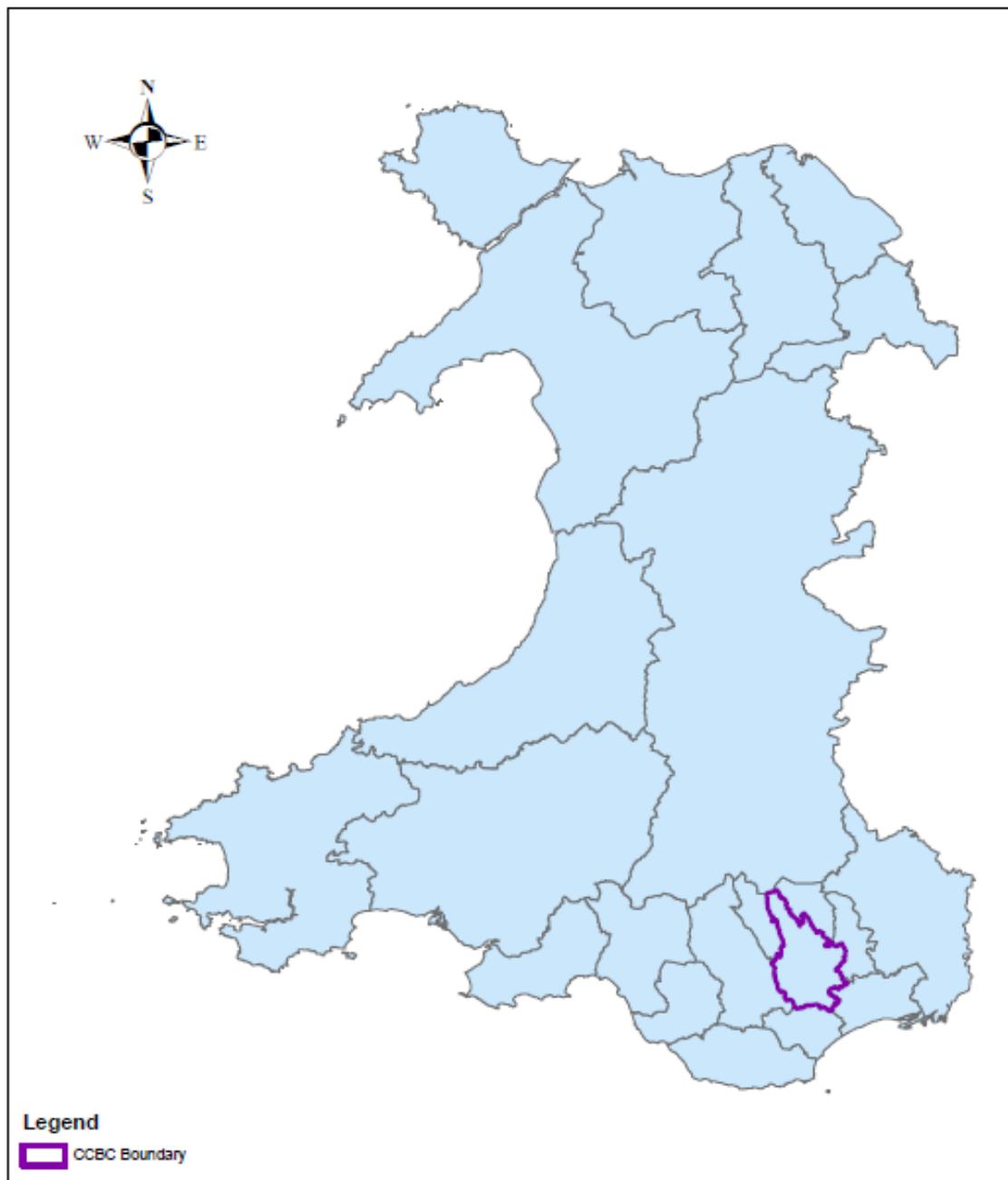
There is also a requirement for consultation between Natural Resources Wales and the Environment Agency and the Lead Local Flood Authorities as the Flood Risk Management Plans and the River Basin Management Plans are developed.

2. Study Area

2.1. Administrative Area.

Caerphilly County Borough Council is a Unitary Authority situated within the valleys of South East Wales. It has a population of approximately 170,000 and an area of 27,763 hectares. Caerphilly County Borough Council is a mix of urban communities generally built on steeply sloping hillsides or within the valley basins. (See Figure 2: All Wales Map)

The study area is served by one water company – Dŵr Cymru Welsh Water and has three major catchments which drain into the Rivers Rhymney, Sirhowy and Ebbw Fawr.



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Figure 02: All Wales Map

List of features used in counts to assess flood risk:

Natural Resource Wales and the Environment Agency produced a document “Flood Risk Maps - Risk of Flooding from Surface Water – Severn River Basin District” in which they provided details of the features to be considered when considering surface water flood risk.

The features have been divided into three categories namely Risk to People, Risk to Natural Economic Activity and Risk to Natural and Historic Environment. A table of all the features is provided below together with the counts for each feature covering the whole of Caerphilly County Borough Council and the Flood Risk Area as indentified in the Preliminary Flood Risk Assessment.

People And Property	Totals For CCBC	Totals For Flood Risk Area
Properties (n)	76989	57362
People (n) (multiplier 2.35)	180924	134801
Services (n)	843	769
Risk to Economic Activity		
Non-Residential Properties (n)	13525	9213
Airports (n)	0	0
Primary/Trunk Roads (km)	8.8	0
Main Line Railways (km)	45.1	37
Agricultural Land – Grades 1, 2 and 3 (ha)	1866.9	1075.0
Risk to Natural and Historic Environment		
Bathing waters (n)	0	0
Environmental Planning Regulations (EPR) installations (n)	69	39.8
Special Areas of Conservation (SAC) (ha)	39.8	39.8
Special Protection Areas (SPA) (ha)	0	0
Ramsar Sites (ha)	0	0
World Heritage Sites (ha)	0	0
Sites of Special Scientific Interest (SSSI) (ha)	240.3	103
Parks and Gardens (ha)	683	138.4
Scheduled Ancient Monuments (ha)	64.6	33.7
Listed Buildings (n)	369	259
Licensed Abstractions (LA) (n)	18	9
Sites of Interest for Nature Conservation (SINC) (ha)	7418.8	2843.1

Table 01: Counts of features in Caerphilly County Borough Council and the Flood Risk Area

River catchments within Caerphilly County Borough Council:

Surface water from the upper reaches of the catchment drains into the River Rhymney and the Nant Bargod Rhymni. The confluence of the two rivers is at Bargoed. The eastern sectors drain to the Sirhowy and Ebbw and the Nant y Aber in the Western section. The Southern section drains into the Nant Gledyr, which joins the River Rhymney in Caerphilly.

2.2. Flood Risk in Caerphilly County Borough Council.**Summary of types of flood risk present in Caerphilly County Borough Council:**

Local flood risk is defined within the Act as being a flood risk from:

1. Ordinary Watercourses – all watercourses that are not designated main river;
2. Surface Runoff - rainfall or other precipitation which is on the surface or ground and has not entered a watercourse drainage system or public sewer;
3. Groundwater - water that has percolated into the ground and may form underground ponds or streams, which may discharge above ground but lower down the catchment;
- 4 The interface between main rivers and surface water flows.

More detail of the flood risk is given below.

Catchment characteristics:

The terrain within Caerphilly County Borough Council area is typical of all the valleys of the South East Wales. The catchments consist of steep hillsides, which are generally formed of impermeable clay overlaying various rock strata, with steep flowing rivers in the valley floor. This combination of characteristics leads to the catchments being very “flashy” meaning that runoff from storms is almost instantaneous giving rise to high flows, which generally subside very quickly in time scale of minutes rather than hours or days. This is particularly relevant to surface water runoff and ordinary watercourses.

Natural Resources Wales have a supervisory duty on main river watercourses e.g. River Rhymney, under the requirements of the Water Resources Act 1991. Whilst main rivers tend to be larger and have greater catchments areas than the ordinary watercourses, within Caerphilly County Borough Council they still respond rapidly to rainfall taking hours to achieve peak flows as opposed to days.

Groundwater:

Groundwater flow, although not a major problem in the Caerphilly County Borough Council area is somewhat different to surface water runoff as rainwater has to penetrate through the clay before percolating through the rock strata and into the old 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 flows 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. The water generally escapes through old mine entrances such as adits and mine shafts. Occasionally water from old mine workings discharges in unexpected locations particularly on hillsides below the workings.

The Flood Risk Management Plan will allow for investigations of the location of mine water flows and their likely volume, if there is evidence to indicate that such flows could present a flood risk.

It is also common for mine water to be coloured red, which is usually a sign that the water is ferruginous meaning that it contains iron salts, which are detrimental to the quality of the watercourse below the discharge point.

It is proposed that, if required, measures will be introduced that will remove the iron salts from the mine water and thus improve the quality of the water downstream of the discharge.

Surface water runoff:

Flooding from surface water is usually caused by intense rainfall either after periods of persistent rainfall, which has saturated the catchment, or following a period of dry weather, causing the ground surface to become hard and impermeable. Both scenarios result in high runoff characteristics of the catchment leading to high peak flows.

Flooding in these circumstances is often exacerbated by lack of cut off ditches and drains, ditches being filled in or piped, or poor maintenance of ditches and watercourses by riparian owners. Damage to streams and other drains may also be caused by developers or livestock.

Increases to the runoff characteristics of the catchment may be caused by farmers ploughing at right angles to contours rather than parallel to them, removal of top soil, removal of vegetation, including the felling of trees or other site clearance. Generally these issues are all likely to give rise to increases in surface water flows.

Runoff will be altered if an area is subject to a new development such as housing. Although the total runoff is likely to increase, controls will be imposed to restrict the maximum rate of runoff from these developments to a level no greater than greenfield runoff or existing discharge rates where appropriate.

Highway drainage:

Flooding from highway drainage 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 into the gullies. Caerphilly County Borough Council mitigates the effects of gullies blocking by having an operational procedure that ensures all gullies are cleaned at least twice a year.

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 flush of runoff.

The Flood Risk Management Plans will look at the possibility of installing measures such as swales and reed beds that will reduce velocities and improve water quality.



SURFACE WATER FLOODING

Ordinary watercourses:

The most frequent form of flooding in Caerphilly County Borough Council arises from the blockage of grids at the entrance to the culverts taking the water from ordinary watercourse. This usually occurs when intense rainfall causes leaf fall and other vegetation to enter the watercourse resulting in a build up of debris at the front of the grids. Caerphilly County Borough Council has an operational procedure, which is designed to minimise this risk by carrying out routine maintenance and pre-emptive cleaning prior to heavy rain when forecast.

Measures will be introduced to replace substandard grids with grids designed to modern standards including additional upstream sacrificial grids.

Flooding may also occur as a result of culvert failure due to the collapse of sidewalls and roofs or the scouring of the culvert invert. This is particularly prevalent in older systems many of which have already exceeded their design life.

Flooding may also be caused by inadequate maintenance, which is normally the responsibility of the riparian owners. Capacities of pipes are often significantly reduced by the build up silt and debris within the culverts.

This is difficult to manage proactively as it requires a significant level of resources to effectively inspect all culverts; therefore inspections will be restricted to systems where there is evidence that the capacity has been adversely affected.

Although culvert capacity has not been found to be the most significant form of flooding within ordinary watercourses it has been considered as part of this Flood Risk Management Plan. Surveys and calculations will be carried out to determine the maximum flow rates within significant culverts by consideration of intake conditions and hydraulic capacities. More detailed runoff calculations will be carried out for some catchments and where pipes are shown to be of inadequate capacities consideration will be given to improving the intake or in exceptional circumstances, their replacement with suitably sized alternatives or the construction of additional relief culverts or channels.

Illegal connections to existing culverts and the culverting of watercourses without consent also present a potential source of flooding and pollution. It is anticipated that where illegal works are identified the Council as the Lead Local Flood Authority will utilise its recently acquired powers to remedy the situation.

Channels:

Flooding within channels is usually caused by lack of maintenance. Where channels are in the ownership of Caerphilly County Borough Council, operational procedures are in place to ensure that the capacity of the channel is not impaired. Inspection of channels, where there is significant risk of flooding, is carried out on a regular basis and debris is removed. The grass is not usually cut as this is helpful in the reduction of pollution. Trees and shrubs are not usually removed as their root system often helps to stabilise the ditches. However, where flows are impeded trees and shrubs will be cut back as appropriate.

Combined sewers:

The sewer network in the Caerphilly County Borough Council area is mostly made up of combined sewers that take both foul sewage and surface water. These are all in the ownership of Dŵr Cymru Welsh Water. Flows in these pipes are usually controlled through the installation of Combined Sewer Overflows, which operate to allow excess flows to be removed from the system and discharged into natural drainage channels, protecting properties from sewer flooding.

This method of controlling flows can cause foul sewage, mixed with rainwater to be discharged into the surface water drainage systems and main rivers during periods of heavy rainfall. This can have an adverse affect on the quality of water. The licensing and monitoring of all Combined Sewer Overflows is managed by Natural Resources Wales regardless of whether they discharge to main river or ordinary watercourses.

Caerphilly County Borough Council will work collaboratively with our partners Natural Resources Wales and Dŵr Cymru Welsh Water to identify all Combined Sewer Overflows and to establish their efficiency and the quality of water being discharged.

Where necessary, Caerphilly County Borough Council will work with Natural Resources Wales and Dŵr Cymru Welsh Water to introduce measures which will reduce the quantity of foul sewage being discharge from the Combined Sewer System into surface water systems.

River flooding:

There are significant areas within Caerphilly County Borough Council which are also subject to river flooding. River flooding remains within the remit of Natural Resources Wales and is covered in the Severn River Basin Flood Risk Management Plan. Figures for river flooding have not been included in this report as it could result in double counting of some flood risk.

Preliminary Flood Risk Assessment:

The Preliminary Flood Risk Assessment process was carried out in order to establish the level of flood risk within each Lead Local Flood Authorities area. The process looked specifically at flooding from surface water, groundwater and ordinary watercourses and the interface with flooding from main river. Main river flooding however, still remains the responsibility of Natural Resource Wales.

In order to have consistency of approach the Department for Environment for Food & Rural Affairs and Welsh Government identified a number of key risk indicators and their thresholds to establish significant risk and to determine the existence of Flood Risk Areas.

The methodology was based on using the flood maps produced by the Natural Resources Wales to identify 1km squares where flood risk exceeds a defined threshold. These squares are known as Areas above Flood Risk Threshold (Blue Squares). The key flood risk indicators and their thresholds are as follows: -

- A minimum of 200 people;
- A minimum of 20 businesses;
- 2 or more critical services.

Natural Resources Wales identified 59 blue squares within Caerphilly County Borough Council.

Where clusters of these Blue Squares occur, it identifies an area of concentrated flood risk. Where four or more touching Blue Squares are within a 3km x 3km square, the whole 3km x 3km square has been considered as an area that could form part of an indicative Flood Risk Area.

The key flood risk indicators for establishing an indicator Flood Risk Area was set as: number of people at risk of being affected by flooding exceeding 5000.

On the basis of the 59 blue squares, 47 of which are within the indicative Flood Risk Area, and the methodology defined above, Natural Resources Wales identified an indicative Flood Risk Area within Caerphilly County Borough Council of 132km²

In order to review the indicative Flood Risk Area, all 277km squares within Caerphilly County Borough Council were reviewed and Caerphilly County Borough Council was satisfied that all the squares which were listed by Natural Resources Wales as areas above the flood risk threshold had been correctly identified.

The Key Flood Risk Indicators for Caerphilly County Borough Council Flood Risk Area has been calculated as follows:-

Human Health Consequences:	
Number of People (2.35 multiplier)	16,654
Other Human Health Consequences:	
Number of Critical Services Flooded	69
Economic Consequences – Number:	
Of Non-Residential Properties Flooded	1,955

As part of the Preliminary Flood Risk Assessment process, significant past flooding events within Caerphilly County Borough area were also considered.

To decide on the significance of an individual flood, Department for Environment for Food & Rural Affairs, Welsh Government and the Natural Resources Wales set key flood risk indicators which define a Flood Risk Area in Wales as having 5,000 people at risk or an individual 1km square where at least 200 people or 20 businesses or more than 1 critical service might be flooded to a depth of 0.3 metres and above by a rainfall event with a chance of 1 in 200 of occurring in any given year.

Caerphilly County Borough Council as a Lead Local Flood Authority has set the key flood risk indicator of people at risk of flood at a threshold of 200 (equivalent to 85 properties) to decide if a flood is of local significance.

A flood event of this magnitude is at least one level of consequence down from the national threshold but still represents a flood of considerable magnitude.

The data readily available has been analysed to give a number of properties flooded for each incident and there were no records of flooding which affected 85 or more residential properties.

Conclusions drawn from the Flood Hazard and Flood Risk Maps at a Caerphilly County Borough Council area wide level:

Background

Under Part 3 of the Flood Risk Regulations 2009, Natural Resources Wales has the duty to prepare for each flood risk area, Flood Hazard and Flood Risk Maps related to the risk of flooding from the sea, main rivers and reservoirs while the Lead Local Flood Authorities has the duty to prepare Flood Hazard and Flood Risk Maps related to surface water flooding for the flood risk areas identified in the Preliminary Flood Risk Assessments.

A service level agreement was signed between Welsh Government, Natural Resources Wales and the Environment Agency for the production of these maps and JBA consultants were contracted to produce the maps on behalf of Environment Agency, Natural Resources Wales and Lead Local Flood Authorities. The maps were completed and published as required under the Flood Risk Regulations 2009 in December 2013.

The information in the maps includes the following:

- Data for each of the modelling chances of flooding - 1 in 30 (3.3%), 1 in 100 (1%) and 1 in 1000 (0.1%) - in any given year;
- Flood extent - the extent of the land that could be affected;
- Flood depth - the depth of flooding;
- Velocity - the velocity of flooding;
- Hazard – the flood hazard rating (defined as a function of the concurrent depth and velocity);
- Flow direction – the direction of flow, on a metre grid;
- Flow direction – 25m – direction of flow, displayed on a 25m grid (to allow viewing on a scale of 1:10,000).

Hazard ratings:

Hazard has been defined as a combination of velocity (v), depth (d) and a debris factor (DF).

The debris factor has been defined as: **DF = 0.5 for d <0.25, DF =1 for d >=0.25**

Hazard is then calculated using the formula: **Hazard = ((0.5 + 0.5)*d) +DF**

Viewing the maps:

The updated Flood Map for Surface Water (uFMfSW) can be viewed by the public on:

<http://naturalresources.wales/our-evidence-and-reports/maps/?lang=en>

The uFMfSW can be viewed and downloaded by only the Lead Local Flood Authorities using the password protected 'Geostore' provided by the Environment Agency.

The risk maps have been generated from the uFMfSW and the National Receptor Dataset (NRD). There are three types of maps showing what is at risk of flooding:

- Risk to People;
- Risk to Economic Activity and;
- Risk to Natural and Historic Environment.

All three of these have been taken into account in the preparation of this Flood Risk Management Plan.

Updated Flood Maps for Surface Water:

Data used

For the purpose of the Flood Risk Management Plans, the extents maps available from the Geostore website have been used. The extent map reflects the maximum flood extents, shown on the depth, velocity and hazard maps for each probability: 1 in 30, 1 in 100 and 1 in 1000 chance of flooding in any year.

For any one probability there are three sets of raw model outputs: from the 1, 3 and 6 hour rainfall duration model runs. The three sets of raw data for that probability have been combined to a 'critical storm duration' dataset, by adopting the set of results for each cell from whichever of the three runs gave the greatest maximum depth of flooding. This 'critical storm duration' data was then processed to remove:

- Shallow/lowest hazard flooding: anywhere with a hazard rating less than 0.575 (equivalent to 150mm of still water, 100mm of water at around 0.5m/s, 50mm of water at 2m/s);
- 'Speckles' of flooding: any flooded area of less than 100m²;
- 'Tiny islands' any dry area surround by water of less than 50m².

This resulted in a 'flood extent' which was used as a boundary to trim the depth, velocity and hazard data so that the datasets all cover the same area and we don't get depth without velocity, etc.

This process was repeated for 1 in 30, 1 in 100 and 1 in 1000, and the three extents published together to show areas at high, medium and low risk flooding.

These maps may be accessed by Lead Local Flood Authorities using the password protected 'Geostore' provided by the Environment Agency.

Counts included in this Flood Risk Management Plan:

- 1 Risk to people and properties;
 - a. Number of people in areas at risk of flooding – depth >0mm
 - b. Number of residential properties at risk of flooding – depth >200mm
- 2 Risk to economic activity;
 - a. Non-residential properties in area at risk of flooding – depth >0mm
 - b. Airports
 - c. Primary/Trunk Roads
 - d. Main Line Railways
 - e. Agricultural land – Grades 1, 2 and 3
- 3 Risk to Natural and Historic Environment;
 - a. Bathing Waters
 - b. Environmental Permitting Regulations (EPR) installations
 - c. Special Areas of Conservation (SAC)
 - d. Special Protection Areas (SPA)
 - e. Ramsar Sites
 - f. World Heritage Sites
 - g. Sites of Special Interest (SSSI)
 - h. Parks and Gardens
 - i. Scheduled Ancient Monuments
 - j. Listed Buildings
 - k. Licensed Abstractions (LA)
 - l. Sites of Interest for Nature Conservation (SINC)

With the exception of 1b, above, namely:- Number of residential properties at risk of flooding – depth >200mm, all the counts have been identified by Environment Agency/Natural Resources Wales as the relevant counts to be used in this Flood Risk Management Plan to consider the flood risk from surface water.

Caerphilly County Borough Council has included this additional count as it seems to be the most appropriate measure of properties likely to be affected by internal flooding.

Location of information for Lead Local Flood Authorities with Flood Risk Areas:

JBA produced these counts as part of the contract but only for the 8 Lead Local Flood Authorities within Wales with Flood Risk Areas.

A zipped file for each Lead Local Flood Authority was also made available to download.

The zipped file provided the data in ESRI Geodatabase and Mapinfo formats (for spatial querying), and Access database format (for non-spatial querying).

The download also includes the following documentation:

- uFMfSW Property Point Summary Note – explains what the dataset is and what it can be used for;
- Detailed document about the uFMfSW Property Points dataset – further information about how it was created and how it can be used.

Analysing the data

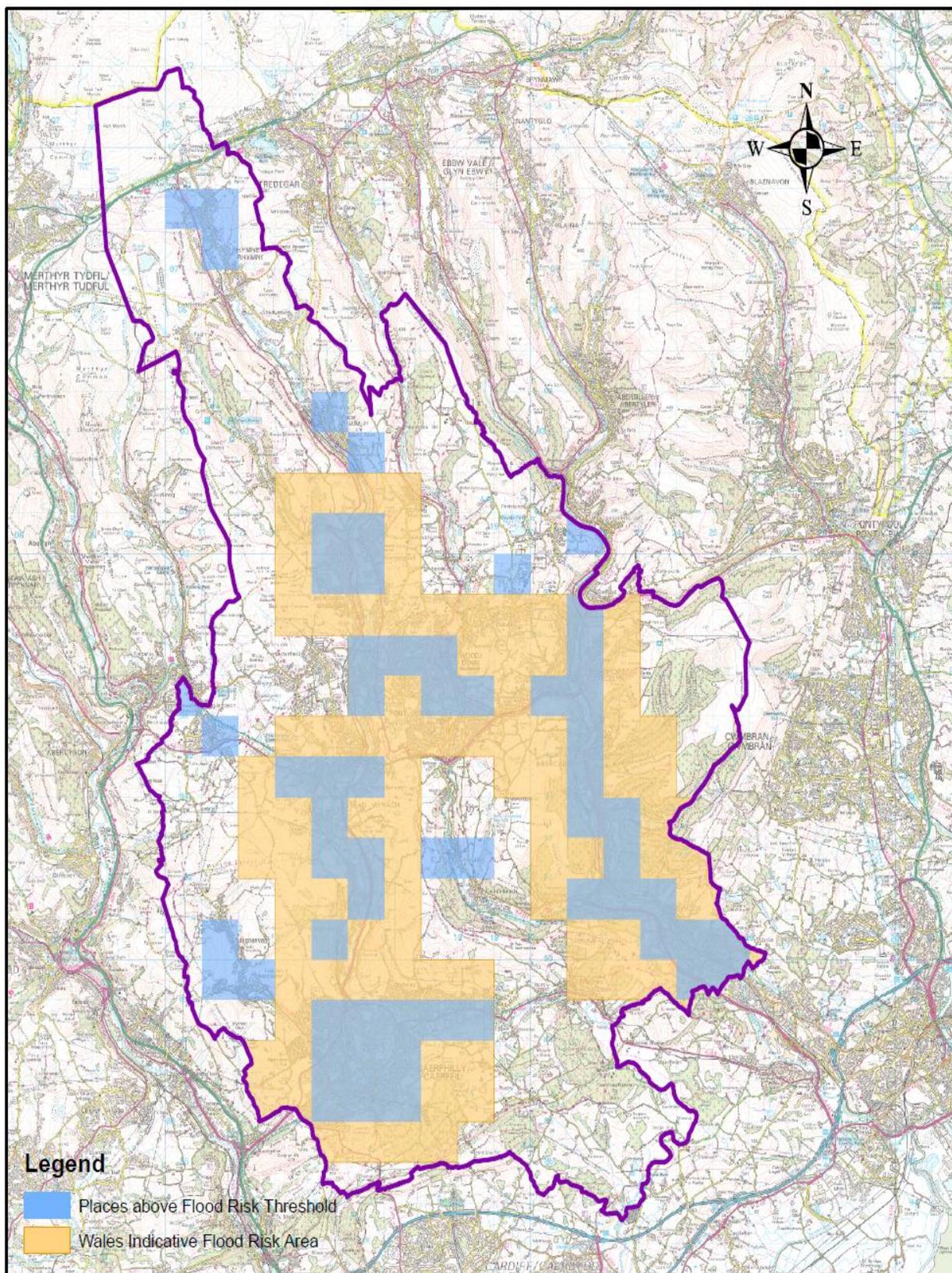
Although the majority of the data has been provided by the Environment Agency, Caerphilly County Borough Council verified the accuracy of the information by carrying out our own counts for people, economic activity and Natural and Historic Environment. The counts were replicated to a very high degree of accuracy giving confidence in the data provided by Environment Agency and our own procedures.

References data

The Caerphilly County Borough Council counts were carried out in accordance with the revised Environment Agency methodology and information provided in: **The updated Flood Map for Surface Water (uFMfSW) Property points dataset.**

The following dataset were used to generate the counts:

- **National Receptor Dataset (NRD)** which contains data on listed buildings, scheduled ancient monuments, registered parks and gardens, environmental permitting sites, trunk/primary roads, railways and SSSI's;
- **uFMfSW Property Point Dataset** containing residential and non-residential property point data within a defined Local Authority's area. In addition to the standard Ordnance Survey address layer 2 property data; the dataset details the percentage of perimeter that is wetted in a P30, P100 and P1000 rainfall event at 6 different depths: 0mm, 150mm, 200mm, 300mm, 600mm and 900mm;
- **Licensed Abstraction spreadsheet** containing details of all active abstraction licences within each Lead Local Flood Authority;
- **Vector Map District** is an open source data from Ordnance Survey containing simplified background mapping for reference purposes.



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Figure 03: Flood Risk Area and Blue Squares for Caerphilly County Borough Council

2.3. Top areas at risk from Surface Water Flooding in Caerphilly County Borough Council

For the purpose of the flood risk analysis Caerphilly County Borough Council has been divided into 44 Community Areas. 23 of the Community Areas are within the Flood Risk Area and details of these Flood Risk Areas given in Section 6 of this report. The remaining 21 Community Areas are dealt with in Section 7.

Community Areas have been based in ward boundaries but in order to indentify the flood risk more precisely some of the wards have been divided into smaller and bigger Community Areas as follows:

	Community Area	Area (ha)	Population	In Flood Risk Area
1	Aberbargoed	340	3666	Yes
2	Abercarn	1651	5581	Yes
3	Abertridwr	609	3657	No
4	Abertysswg	285	1473	No
5	Argoed	563	881	No
6	Bargoed	375	8871	Yes
7	Bedwas	657	4054	Yes
8	Blackwood	275	6359	Yes
9	Brithdir	197	768	No
10	Caerphilly East	308	5205	Yes
11	Caerphilly North	268	7024	Yes
12	Caerphilly South	699	8397	Yes
13	Caerphilly West	585	11715	Yes
14	Cefn Fforest	216	6079	Yes
15	Crosskeys	574	3675	Yes
16	Crumlin	1296	5767	Yes
17	Deri	1122	1304	No
18	Fochriw	843	1241	No
19	Gelligaer	878	2992	No
20	Hengoed	207	5048	No
21	Llanbradach	572	4489	Yes
22	Machen	797	4091	No
23	Maesycwmmmer	750	2254	Yes
24	Manmoel	692	82	No
25	Markham	311	1798	Yes
26	Nelson	1098	4780	No
27	New Tredegar	534	3896	No
28	Newbridge	1036	6763	Yes
29	Pengam	232	3760	Yes
30	Penmaen	483	5196	Yes
31	Penpedairheol	236	3314	No
32	Pontllanfraith	577	8608	Yes
33	Pontlottyn	242	2075	No
34	Pontymister East	273	6557	Yes
35	Pontymister West	516	5732	Yes
36	Rhymney	244	3318	No
37	Rudry	2344	1022	No
38	Senghenydd	722	3095	No
39	Tir-phil	233	649	No
40	Tri-y-berth	92	1476	No
41	Trethomas	381	2512	Yes
42	Twyn Carno	1383	2658	No
43	Ynysddu	1416	3941	No
44	Ystrad Mynach	627	5102	Yes

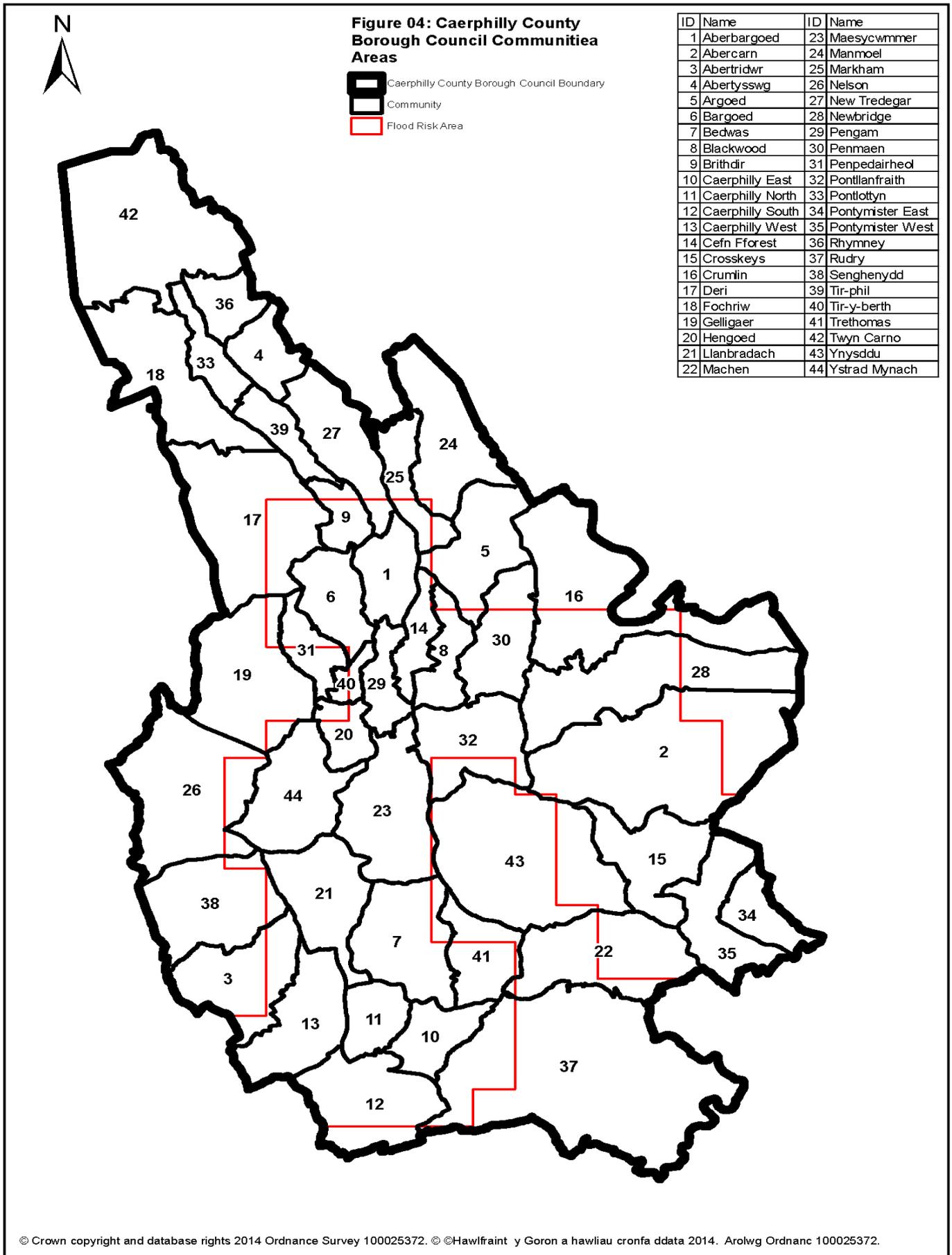
Table 02: Community Areas

Community Areas Within Flood Risk Area	Aberbargoed	Abercarn	Bargoed	Bedwas	Blackwood	Caerphilly E	Caerphilly N	Caerphilly S	Caerphilly W	Cefn Fforest	Crosskeys	Crumlin	Llanbradach	Maesycwmmr	Markham	Newbridge	Pengam	Penmaen	Pontllanfraith	Pontymister E	Pontymister W	Trethomas	Ystrad Mynach
	RISK TO PEOPLE																						
Residents in areas at risk of flooding depth >0.0m																							
People (n) (multiplier 2.35)	143	157	606	388	395	602	463	639	747	362	221	454	437	169	75	548	369	244	435	237	834	362	515
Residential Properties at risk of internal flooding depth > 0.2m																							
Residential Properties (n)	8	37	29	73	34	178	58	134	150	40	47	82	95	10	12	88	45	28	64	19	189	50	105
Services (n)	0	2	7	3	2	3	5	1	1	0	0	3	2	3	0	4	1	0	3	0	6	1	2
RISK TO ECONOMIC ACTIVITY																							
Non-Residential Properties (n)	14	42	62	55	133	30	84	59	30	1	23	76	16	43	2	49	53	24	91	14	145	67	105
Airports (n)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Main Line Railways (km)	0	0.4	1.2	0	0	0.1	0	0.8	0	0	0.1	0.8	0.4	0	0	0.4	0	0	0	0.1	0.2	0	1.6
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	13.6	0	15.3	15.2	0	0.2	0	0	0	17.3	25.2	0	0	0	0	0	1.0	2.3	7.8	1.7
RISK TO NATURAL AND HISTORIC ENVIRONMENT																							
Bathing waters (n)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Environmental Planning Regulations (EPR) installations (n)	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	3	0	2	1	0
Special Areas of Conservation (SAC) (ha)	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ramsar Sites (ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
World Heritage Sites (ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0.3	0	0	0	0	0	0	0.7	5.1	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0
Parks and Gardens (ha)	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0	0	0	4.6	0.6	0	0	0	6.8	0	0	0	0	0	0	0	0	0.1	0	0
Listed Buildings (n)	1	2	1	2	0	1	0	0	0	0	2	1	2	0	0	1	0	4	1	3	3	0	1
Licensed Abstractions (LA) (n)	0	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	2	0	0	0	1
Sites of Interest for Nature Conservation (SINC) (ha)	2.4	24.8	6.7	8.1	6.0	8.7	6.2	3.0	13.2	0.7	8.5	19.0	10.9	12.4	4.1	14.3	6.1	8.8	7.6	3.0	10.1	8.6	8.4

Table 03: Risk for Community Areas Within Flood Risk Areas

Community Areas Not In Flood Risk Area	Abertridwr	Abertysswg	Argoed	Brithdir	Deri	Fochriw	Gelligaer	Hengoed	Machen	Manmoel	Nelson	New Tredegar	Penpedairheol	Pontlottyn	Rhymney	Rudry	Senghennydd	Tirphil	Tir-y-berth	Twyn Carno	Ynysddu
RISK TO PEOPLE																					
Residents in areas at risk of flooding depth >0.0m																					
People (n) (multiplier 2.35)	169	122	31	21	21	75	167	125	197	0	555	148	411	247	637	78	320	5	148	484	143
Residential Properties at risk of internal flooding depth >0.2m																					
Residential Properties (n)	22	22	8	8	5	4	24	4	14	0	52	30	95	26	70	3	36	0	20	60	16
Services (n)	0	0	0	0	1	1	2	0	1	0	2	2	1	0	1	0	1	0	1	1	1
RISK TO ECONOMIC ACTIVITY																					
Non-Residential Properties (n)	17	18	6	2	12	7	21	13	36	0	79	16	9	55	61	10	46	2	5	46	19
Airports (n)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.9	0
Main Line Railways (km)	0	0	0	0.1	0	0	0	0.8	0.1	0	0	0	0	1.6	0	0.2	0	0.2	0.6	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0	0	0	0	0	19.1	0	0	0	0	0	0	92.5	0	0	0	0	0
RISK TO NATURAL AND HISTORIC ENVIRONMENT																					
Bathing waters (n)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Environmental Planning Regulations (EPR) installations (n)	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ramsar Sites (ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
World Heritage Sites (ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0	0	0	11.7	0	0	0	0	0	0	0	0	0.4	0	0	0	0.1	0
Parks and Gardens (ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.7	0	0	0	0	0
Scheduled Ancient Monuments	0	0	0	0	0	0	0.1	0	0.3	0	0	0	0	0	0	0.1	0	0	0	0	0
Listed Buildings (n)	0	0	1	0	0	0	1	0	0	0	1	0	0	1	3	0	1	0	0	0	1
Licensed Abstractions (LA) (n)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	5.4	3.8	10.5	2.3	23.9	28.9	17.9	6.6	10.7	7.6	12.1	7.3	4.1	9.0	1.1	35.4	4.7	6.1	2.9	47.3	19.8

Table 04: Risk for Community Areas Not in Flood Risk Area



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Figure 04: Caerphilly County Borough Council Communities Areas

3. How we Currently Manage Flood Risk in Caerphilly County Borough Council

Procedures, measures and powers:

Flood Risk in Caerphilly County Borough Council is managed through:-

1. Operational procedures, which have been developed over years through good custom and practice;
2. Measures, which were included in the Local Flood Risk Management Strategy;
3. Powers given to all Lead Local Flood Authorities through the Flood and Water Management Act 2010 and the Land Drainage Act 1991 and 1994;
4. As Caerphilly County Borough Council is also the Highways Authority for the area, powers under the Highway Act 1980.

Operational procedures:

The main operational procedures used to manage flood risk in Caerphilly County Borough Council are listed below:

1. Routine cleaning of gullies on a 6 monthly rota system;
2. Emergency cleaning of blocked gullies, which have been notified to Caerphilly County Borough Council Highway Department by members of the public;
3. Routine inspections and adhoc cleansing of intake grids and severe weather culverts;
4. Emergency inspection and clearance of severe weather grids prior to and during periods of intense rainfall.

Measures contained within the Local Flood Risk Management Strategy:

Measures contained within the Local Flood Risk Management Strategy that are currently being used by Caerphilly County Borough Council to manage and reduce flood risk are listed below and the detailed measures have been included in Appendix 2 of this report.

The measures include the following:

1. Sustainable and Strategic Development Planning - Local Flood Risk Management Strategy Clause 6.13.1;
2. Strategic Flood Risk Assessment/Strategic Flood Consequence Assessment - Local Flood Risk Management Strategy Clause 6.13.2;
3. Relocation - Local Flood Risk Management Strategy Clause 6.13.4;
4. Sustainable Drainage - Local Flood Risk Management Strategy Clause 6.13.7;
5. Flood Awareness - Local Flood Risk Management Strategy Clause 6.14.2;
6. Flood Warning - Local Flood Risk Management Strategy Clause 6.14.3;
7. Flood Forecasting - Local Flood Risk Management Strategy Clause 6.14.4;
8. Emergency Response Plans - Local Flood Risk Management Strategy Clause 6.14.5;
9. Community Flood Plans - Local Flood Risk Management Strategy Clause 6.14.6;
10. Land Management – Local Flood Risk Management Strategy Clause 6.15.1;
11. Resilience – Local Flood Risk Management Strategy Clause 6.15.2;
12. Resistance – Local Flood Risk Management Strategy Clause 6.15.3;
13. Restoration – Local Flood Risk Management Strategy Clause 6.15.4;
14. Environmental Enhancements – Local Flood Risk Management Strategy Clause 6.15.5;
15. System Asset Management - Local Flood Risk Management Strategy Clause 6.16.1.

16. Defence/Structures and Maintenance - Local Flood Risk Management Strategy Clause 6.16.2;
17. Channel Maintenance and New Construction – Local Flood Risk Management Strategy Clause 6.16.3;
18. Culverts, Gullies, Highway and Culvert Infrastructure Maintenance and New Construction – Local Flood Risk Management Strategy – Clause 6.16.4;
19. Investigation – Local Flood Risk Management Strategy – Clause 6.17.1;
20. Local Property-level Flood Mitigation - Resilience – Local Flood Risk Management Strategy – Clause 6.17.4;
21. Local Property-level Flood Mitigation - Resistance – Local Flood Risk Management Strategy – Clause 6.17.5.
22. Pre-feasibility Studies, Feasibility Studies – Local Flood Risk Management Strategy – Clause 6.17.6.
23. Project Plans – Local Flood Risk Management Strategy – Clause 6.17.7.

Additional powers given to Caerphilly County Borough Council under the Flood and Water Management Act 2010:

Under the Flood and Water Management Act 2010 Lead Local Flood Authorities have been given additional duties which directly impact on flood risk management. These include:

1. A duty to investigate all flooding within its area, in so far as a Lead Local Flood Authority consider it necessary or appropriate;
2. A duty to maintain a register of structures and features likely to affect flood risk;
3. A duty to contribute to sustainable developments;
4. Consenting on Ordinary Watercourses (Section 29 of Schedule 2).

3.1. How we prioritise our work.

In order to satisfy the requirements of the National Flood and Coastal Erosion Risk Management Strategy including their four overarching objectives, a total of 19 objectives were included in the Caerphilly County Borough Council Local Flood Risk Management Strategy.

43 measures were included in the strategy in order to implement the detailed objectives.

3.2. Who we work with to manage flood risk in Caerphilly County Borough Council.

The guidance provided by Welsh Government for the development of the Local Flood Risk Management Strategies included a list of the Flood Risk Management Authorities. A list of the organisations Caerphilly County Borough Council works with to manage flood risk is provided below.

All these organisations will be contacted during the consultation for this Flood Risk Management Plan.

More significant consultation will take place with the Risk Management Authorities and are detailed in Section 8 of this report.

The Risk Management Authorities:

- **Natural Resource Wales – Including the former bodies:**

- > Environment Agency Wales
- > Forestry Commission Wales
- > Countryside Council for Wales

- **Lead Local Flood Authorities in Wales**

- Those abutting Caerphilly County Borough Council:**

- > Merthyr Tydfil County Borough Council
- > Blaenau Gwent County Borough Council
- > Rhondda Cynon Taf County Borough Council
- > Torfaen County Borough Council
- > Cardiff City Council
- > Newport City Council
- > Powys County Council

- Those authorities in the South East Wales Flood Risk Management Group (SEWFRMG):**

- > Rhondda Cynon Taf County Borough Council
- > Merthyr Tydfil County Borough Council
- > Blaenau Gwent County Borough Council
- > Monmouthshire County Council
- > Powys County Council
- > Cardiff City Council
- > Newport City Council
- > Neath Port Talbot County Borough Council
- > Torfaen County Borough Council
- > Vale of Glamorgan Council
- > Swansea City Council

- **Water Company**

- > Dŵr Cymru Welsh Water

- **Additional Risk Partners**

- Caerphilly County Borough Council Departments:**

- > Planning Department
- > Emergency Planning
- > Highways Department
- > Environmental Health

- External Partners:**

- > Regional Flood and Coastal Committees
- > Emergency Services and Health Organisations:
 - South Wales Fire and Rescue Service
 - Welsh Ambulance Services NHS Trust
 - Gwent Police
 - Anuerin Bevan University Health Board
- > National Flood Forum
- > National Farmers Union
- > Welsh Office of the National Farmers Union
- > Local Partnerships, Forums and Community Groups

- > National House Builders
- > Network Rail
- > Community and Town Councils:
 - Aber Valley Community Council
 - Argoed Community Council
 - Bargoed Town Council
 - Bedwas, Trethomas and Machen Community Council
 - Blackwood Town Council
 - Caerphilly Town Council
 - Darren, Waterloo and Rudry Community Council
 - Gelligaer Community Council
 - Llanbradach and Pwllypant Community Council
 - Maesycwmmmer Community Council
 - Nelson Community Council
 - New Tredegar Community Council
 - Penyrheol, Trecenydd and Energlyn Community Council
 - Rhymney Community Council
 - Van Community Council
- > Gwent Local Resilience Forum
- > SWTRA – South Wales Trunk Road Agency
- > CADW

The flood risk management functions that may be exercised by the risk management authorities in relation to Caerphilly County Borough Council:

ALL RISK MANAGEMENT AUTHORITIES – GENERAL REQUIREMENTS

When exercising their flood or coastal erosion risk management functions, or in exercising any other function in a manner that may affect flood or coastal erosion risk, all Risk Management Authorities (except water companies), are required to act in a manner consistent with both the Local and National Strategies, and any associated guidance.

In exercising any other function in a manner which may affect a flood risk or coastal erosion risk, a Welsh Risk Management Authority must have regard to both the National and Local Strategies and any associated guidance.

NATURAL RESOURCES WALES

Natural Resources Wales has a dual role of:-

1. Operational responsibilities for flooding from main rivers, the sea and coastal erosion;
2. Oversight responsibilities in relation to all flood and coastal erosion risk management in Wales.

Natural Resources Wales leads on the provision of technical advice and support to the other Risk Management Authorities. They also lead on national initiatives such as Flood Awareness Wales and will be single point of contact for enquiries and information on flood risk.

The Flood and Water Management Act 2010 has placed a number of statutory duties on the Natural Resources Wales including:

1. Co-operating with other authorities, including sharing data;
2. Reporting to the Minister on flood and coastal erosion risk in Wales including the application of the National Strategy;
3. The establishment of Regional Flood and Coastal Committees.

In addition to their statutory duties, the Natural Resources Wales has a number of what are called permissive powers. These are powers that allow them to do something, but do not compel them to. These include:

1. Powers to request information;
2. The ability to raise levies for local flood risk management works, via the Regional Flood and Coastal Committees;
3. Powers to designate certain structures or features that affect flood or coastal erosion risk;
4. The expansion of powers to undertake works to include broader risk management actions;
5. The ability to cause flooding or coastal erosion under certain conditions.

Under the Regulations the Natural Resources Wales also take on an assessment and coordination role at a national level, ensuring the correct information is passed back to the European Commission.

LEAD LOCAL FLOOD AUTHORITY CAERPHILLY COUNTY BOROUGH COUNCIL

Within the Flood and Water Management Act 2010. Caerphilly County Borough Council has been established as a Lead Local Flood Authority for its administrative area. Caerphilly County Borough Council is also the highway authority for the area having responsibility for managing all adopted highways, which are not included within the remit of the South Wales Trunk Road Agency.

Under the terms of the Flood and Water Management Act 2010, Caerphilly County Borough Council is responsible for what is termed 'local flood risk'. This includes the risk of flooding from ordinary watercourses, surface water, groundwater and interaction with main rivers.

The Flood and Water Management Act 2010 places a number of statutory duties on Caerphilly County Borough Council in its new role as Lead Local Flood Authority including:

1. The preparation of local flood risk management strategies (Completed);
2. A duty to comply with the National Strategy;
3. To co-operate with other authorities, including sharing data;
4. A duty to investigate all flooding of structures within its area, insofar as a Lead Local Flood Authority consider it necessary or appropriate;
5. A duty to maintain a register of structures and features likely to affect flood risk;
6. A duty to contribute to sustainable development;
7. Consenting on Ordinary Watercourses.

In addition to these, each Lead Local Flood Authority has a number of what are called permissive powers. These are powers that allow them to do something but do not compel them to. These include:

1. Powers to request information;
2. Powers to designate certain structures or features that affect flood;
3. The expansion of powers to undertake works to include broader risk management actions.

Lead Local Flood Authorities in Wales are likely to take on the role of Sustainable Drainage Systems (SuDS) Adopting and Approving Body in relation to sustainable drainage systems. In this role they will be responsible for both approving the original design of the SuDS and adopting and maintaining the finished system.

DŴR CYMR WELSH WATER

Water companies, when exercising their flood or costal 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 caused by system failures.

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

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

3.3. How this Flood Risk Management Plan has been co-ordinated.

Co-ordination and development of this Flood Risk Management Plan has been achieved through regular meetings of the various groups as listed below:

1. South and East Wales Flood Risk Management Group attended by all Lead Local Flood Authorities in South Wales, Natural Resources Wales, Welsh Local Government Association and Dŵr Cymru Welsh Water;
2. Flood Risk Management Plans Working Group attended by all Lead Local Flood Authorities in South East Wales, Welsh Government, Natural Resources Wales and Welsh Local Government Association;
3. Internal collaboration has also been achieved through regular meetings of the Flood Risk Management Team;
4. Meetings have taken place with Dŵr Cymru Welsh Water.

3.4. Measures already underway in Caerphilly County Borough Council to manage flood risk.

Details of the measures and operational procedures already underway have been listed above, details of which are included in Appendix 2 of this report.

There is a requirement that the measures should address the four categories of Prevention, Protection, Preparedness and Recovery and Review. Details of the type of measures for each category are given in the table below.

Reporting Code	Prevention	
	Type	Measure Description
M21	Avoidance	Measures to prevent the location of new or additional receptors in flood prone areas, such as land use planning policies or regulations.
M22	Removal or Relocation	Measures to remove receptors from flood prone areas, or to relocate receptors to areas of lower probability of flooding and or of lower hazard.
M23	Reduction	Measures to adapt receptors to reduce the adverse consequences in the event of flood actions or buildings, public networks etc.
M24	Other Prevention	Other measures to enhance flood risk prevention (may include, flood risk modelling and assessment, flood vulnerability assessment, maintenance programmes or policies etc).
		Issue ordinary watercourse consents, comment on Flood Consequence Assessment, update and improve the accuracy of flood risk mapping, understand local flood risk better.

Reporting Code	Prevention	
M3	Type	Measure Description
M31	Natural Flood Management/ Run Off and Catchment Management	Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and or storage, enhancement of infiltration etc and including in-channel, flood plain works and the reforestation of banks, that restore natural systems to help slow flow and store water.
M32	Water Flow Regulations	Measures involving physical intervention to regulate flows, such as construction, modification or removal of water retaining structures (e.g. dams or other on-line storage areas or development of existing flow regulation rules), and which have significant impact on the hydrological regime.
M33	Channel, Coastal and Floodplain Works	Measures involving physical interventions to freshwater channels, mountain streams, estuaries, coastal waters and flood prone areas of land, such as construction, modification or removal of structures or the alteration of channels, sediment dynamics management, dykes etc.
M34	Surface Water Management	Measures involving physical interventions to reduce surface water flooding, typically, but not exclusively, in an urban environment, such as enhancing artificial drainage capacity or through sustainable drainage systems (SuDS).
M35	Other Protection	Other measures to enhance protection against flooding, which may include flood defence asset maintenance programmes or policies.
		Ongoing maintenance programme.

Reporting Code	Prevention	
M4	Type	Measure Description
M41	Flood Forecasting and Warning	Measures to establish or enhance a flood forecasting or warning system.
M42	Emergency Event	Measures to establish or enhance flood event institutional emergency response planning.
M43	Public Awareness and Preparedness	Measures to establish the public awareness or preparedness for flood events.
		Flood awareness programme.

Reporting Code	Prevention	
M5	Type	Measure Description
M51	Individual and Societal Recovery	Clean up and restoration activities (buildings, infrastructure, etc). Health and mental health supporting actions, inc managing stress. Disaster financial assistance (grants, tax) including disaster unemployment assistance, temporary or permanent relocation or other.
M52	Environmental Recovery	Clean up and restoration activities (with several sub topics as mould protection, well-water safety and securing hazardous material containers).
M53	Other Recovery and Review	Lessons learnt from flood events, insurance policies.

Each measure listed in the Flood Risk Management Strategy and used in this report has been placed into one of these categories as noted within each measure.

4. Co-ordination with the Severn River Basin Management Plan

4.1. General.

Under the Water Framework Directive, the Environment Agency and Natural Resources Wales have a duty to prepare River Basin Management Plans for each River Basin District. Wales is divided into three River Basin Districts as noted below.

1. Dee situated in the North East of Wales, which extends over the border into England;
2. Severn covering the Central East and South East of Wales which also extend over the border into England;
3. Western Wales covering the whole of the Western sector of Wales from Anglesey to the South Coast.

Caerphilly County Borough Council is located within the southern part of the Severn River Basin, South East Valleys Catchment.

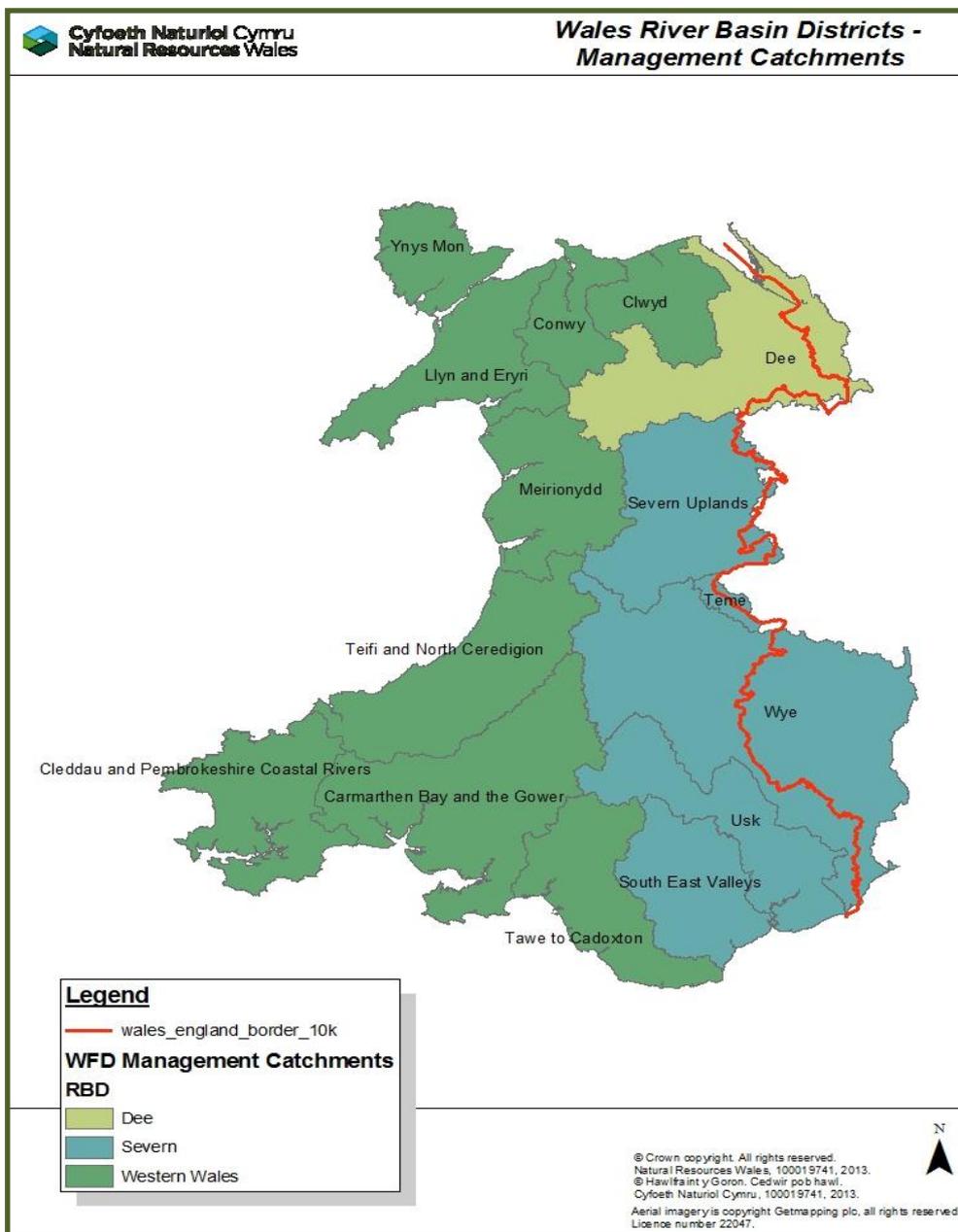


Figure 05: Water Framework Directive Management Catchments for Wales

4.2. Severn River Basin District Overview.

The Severn River Basin District is home to over 5.3 million people and covers an area of 21,590km², with about one third of the districts in Wales. The River Severn is the longest river in Britain and flows into the Severn Estuary. As well as the River Severn and its main tributaries the district includes the rivers of South East Wales, including the Wye, Usk and Taff, and those of the counties of Avon and Somerset that drain into the Severn Estuary.

The district has several major urban centres, including Bristol, Cardiff and Coventry. However, much of the river basin district is rural in character, particularly within the Welsh Borders. About 80% of the land is managed for agriculture and forestry. The key economic sectors in the district are business services, wholesale and distribution, public administration and health. Transport equipment and metals manufacturing are also important industrial sectors.

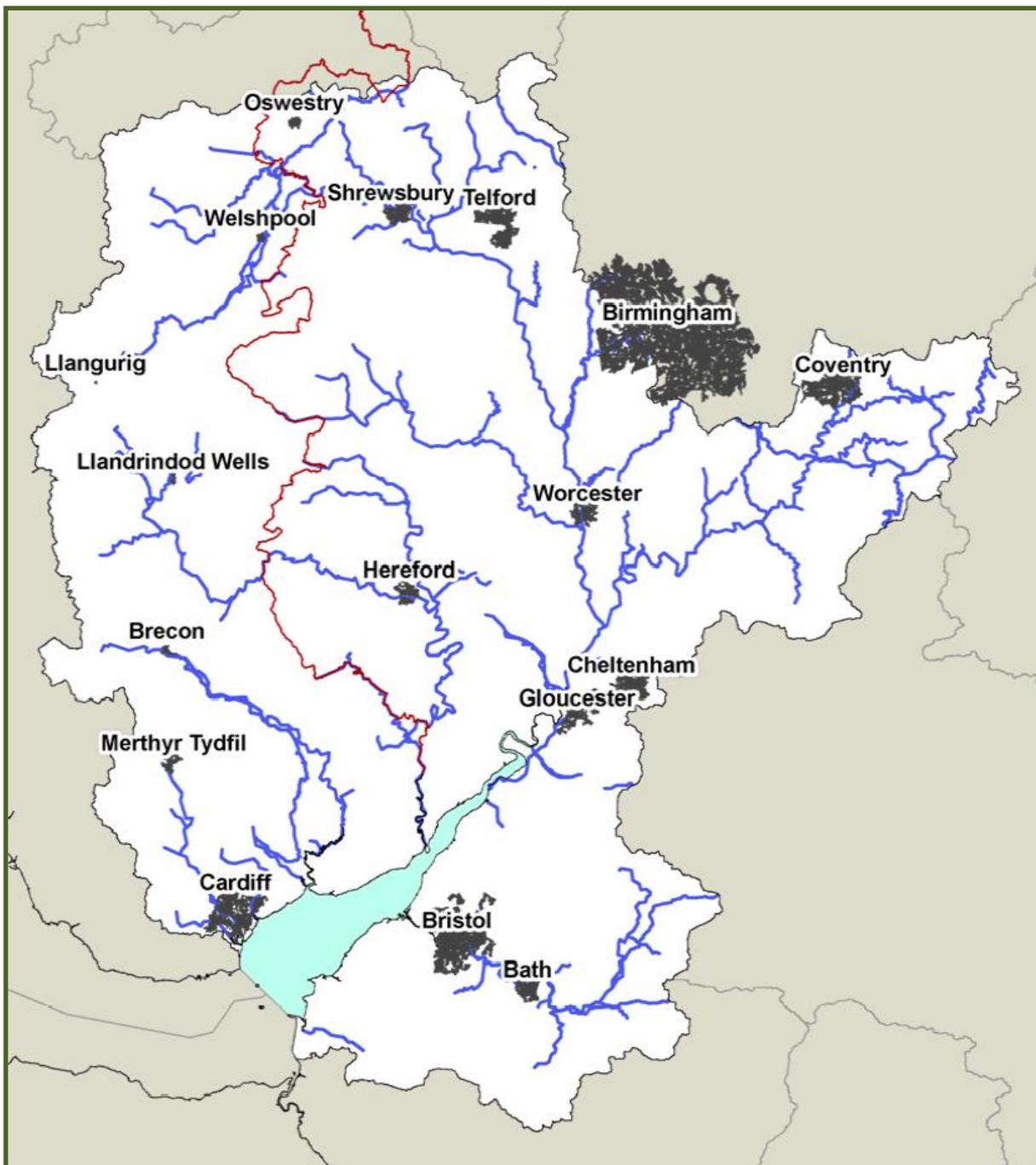


Figure 06: Severn River Basin Catchment Plan

4.3. Summary of coordination of development and implementation of the Flood Risk Management Plan with the River Basin Management Plan.

Co-Ordination with the Severn River Basin Management Plan:

The draft Severn River Basin Management Plan, prepared jointly by the Environment Agency and Natural Resources Wales as a requirement of the Water Framework Directive, was published on the Natural Resources Wales website on 10th October 2014.

As part of the development of the River Basin Management Plan a consultation process was undertaken with Natural Resources Wales including the provision of a questionnaire. The consultation process commenced on 10th October 2014 and run until 10th April 2015. Caerphilly County Borough Council responded to this questionnaire within this time scale.

In addition, Caerphilly County Borough Council has examined the objectives and measures proposed within the River Basin Management Plan, and have indicated within Section 6.1 of this report, details of the measures within the Caerphilly County Borough Council Flood Risk Management Plan that link with the measures proposed within the River Basin Management Plan.

It is anticipated as consultation continues additional measures and links will be identified by Caerphilly County Borough Council to strengthen the links with the River Basin Management Plan.

Link to the River Basin Management Plan Consultation and Summary response document:

http://consult.environment-agency.gov.uk/portal/ho/wfd/draft_plans/consult?pointId=s1405417965041#section-s1405417965041

Co-Ordination with the Severn River Basin Flood Risk Management Plan:

The draft Severn River Basin Flood Risk Management Plan, prepared jointly by the Environmental Agency and Natural Resources Wales as a requirement of the Flood Risk Regulations 2009, was published on the Natural Resources Wales website on 10th October 2014.

As part of the development on the Severn River Basin Flood Risk Management Plan a consultation process has commenced with Natural Resources Wales including the provision of a questionnaire. The consultation process commenced on the 10th October 2014 and run until 31st January 2015. Caerphilly County Borough Council responded to this questionnaire within the time scale.

In addition Caerphilly County Borough Council has examined the objectives and measures proposed within the Severn River Basin Flood Risk Management Plan which specifically relate to Caerphilly County Borough Council and has, indicated within Section 6.1 of this report, detailed the measures within the Caerphilly County Borough Council Flood Risk Management Plan which link with the measures proposed within the Severn River Basin Flood Risk Management Plan.

It is anticipated as consultation continues additional measures and links will be identified by Caerphilly County Borough Council to strengthen the links with the Severn River Basin Flood Risk Management Plan.

Link to Severn River Basin Flood Risk Management Plan:

<https://www.gov.uk/government/publications/severn-river-basin-district-flood-risk-management-plan-frmp-scoping-report>

Links between the measures contained in the Caerphilly County Borough Council Flood Risk Management Plan and the Severn River Basin Management Plan and Flood Risk Management Plan:

Measures taken from Caerphilly County Borough Council Strategy which we will be adopting as part of our Flood Risk Management Plan:

Flood Awareness – Local Flood Risk Management Strategy – Clause – 6.14.2:

This measure links with the measure in the Severn River Basin District Flood Risk Management Plan:

- Raise Flood Awareness within the community.

Land Management – Local Flood Risk Management Strategy – Clause 6.15.1:

This measure links with the River Basin Management Plan for the Severn River Basin District:

- Table 9 Physical modifications – Measure 6 – Vegetation management
- Table 14 Manage pollution from rural areas – Measure 3 – Sustainable woodland and forestry management.

Environmental Enhancements – Local Flood Risk Management Strategy – Clause 6.15.5:

This measure links with the River Basin Management Plan for the Severn River Basin District:

- Table 13 – Manage invasive non-native species – Measure 2 – Mitigation, control and eradication (to reduce extent).

Channel Construction and Maintenance – Local Flood Risk Management Strategy Clause 6.16.3:

This measure links with the River Basin Management Plan for the Severn River Basin District:

- Table 9 Physical modifications – Measure 3 Improvement to channel/bed and/or banks
- Table 12 – Improve the natural flow and level of water – Measure 2 Improvement to condition of channel/bed and or banks.

Culvert Construction and Maintenance – Local Flood Risk Management Strategy Clause 6.16.4:

This measure links with River Basin Management Plan for the Severn River Basin District:

- Table 9 Physical modifications – Measure 2 – Removal or modification of engineering structure.

Investigation – Local Flood Risk Management Strategy Clause 6.17.1:

This measure links with the River Basin Management Plan for the Severn River Basin District:

- Table 9 Physical modifications – Measure 10 – Complete first cycle investigations.

5. Caerphilly County Borough Council Flood Risk Management Plan Objectives.

5.1. Summary of Welsh Government National Flood and Coastal Erosion Risk Management Strategy.

At the request of Welsh Government, Caerphilly County Borough Council has developed a Local Strategy for the management of flood risk in the County Borough Council Area. This document, which was prepared during 2012, was approved by Welsh Government and published in June 2013.

In November 2011 the Welsh Government published “The National Strategy for Flood and Erosion Risk Management in Wales”. This document identifies four overarching objectives that must be addressed within local strategies.

The four overarching objectives are:

1. Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion;
2. Raising awareness of and engaging people in the response to flood and coastal erosion events;
3. Providing an effective and sustained response to flood and coastal erosion events; and;
4. Prioritising investment in the most at risk communities.

In their guidance – “Local Flood Risk Management Strategies” – Local Strategy – November 2011 the Welsh Government listed objectives in relation to social, economic and environmental risk. These objectives have been used by Caerphilly County Borough Council as a foundation for the establishment of detailed objectives, which will ensure the delivery of the strategy.

Flood risk management objectives:

Social:

- Reduce distress (No. of people to flooding);
- Reduce community disruption (No. of residential and commercial properties);
- Reduce risk to life (No. of people exposed to depth x velocity of flow);
- Reduce disruption to critical infrastructure (or maintain operation of).

Economic:

- Reduce economic damage (e.g. Annual Average Damages AAD);
- Reduce cost of management (note: a risk management outcome for use in appraisal).

Environmental:

- Reduce damage to Natura 2000/Sites of Special Scientific Interest (SSSI's)/Biodiversity Action Plan (BAP) sites (or improve sites);
- Improve naturalness (reduce modification of channels/water bodies);
- Water Framework Directive objectives: improve water quality/ecological status (or not deteriorate) - hydromorph and diffuse pollution issues.

5.2. Caerphilly County Borough Council objectives from local strategy.

Clause 3.3.4 of the Local Flood Risk Management Strategies guidance document produced by Welsh Government, advised that high level strategic objectives should be developed around the reduction of potential adverse consequences of flooding for human health, the environment, cultural heritage, economic activity and, if considered appropriate, on local community facilities. Caerphilly County Borough Council has adopted this approach to ensure that the objectives of their Local Strategy are consistent with those required under the Flood Risk Regulations 2009.

In order to comply with these objectives and requirements of the National Strategy, Caerphilly County Borough Council has set its high level objective as follows:

“To reduce flood risk in every area where significant flood risk has been identified.”

This high level objective is also the focus for the Flood Risk Management Plan. It has been used to determine what measures should be included for implementation over the first 6 year cycle so that significant progress will be made towards attainment of this high level objective.

Caerphilly County Borough Council considered three options for the implementation of the Strategy namely; 1) community involvement; 2) reduction of the flood hazard and; 3) enhancement of the flood defence system.

Option 1 - Community Involvement:

Engagement with the public as flood risk partners is an essential part of development, refinement and implementation of The Strategy. Cooperation has been encouraged through Local Flood Forums and via an on-line survey in order to ascertain the views of the public. In addition responses from the public were considered during the publication of the Strategy.

Part of this process involves making the public aware of the flood risk in their locality to enable them to understand the nature of the risk and for them to take personal ownership for their actions during a flood event.

It is essential that the public realise that flood risk cannot be eliminated in its entirety and that the strategy aims to reduce the effect rather than prevent flooding.

The public will be encouraged to establish joint local community groups focusing on flooding issues. Individuals will be requested to construct their own flood plans as well as linking up with other members of the community to develop Community Flood Plans.

The role of the Lead Local Flood Authority will be to provide information through leaflet drops and the Council official website. In addition details of flood warnings will be disseminated through the community by means of telephone calls, texting and the use of community flood wardens.

Depending on the severity of the flood warning, residents will be encouraged to move to a safe part of their homes or to move to a safe location.

Residents will also be encouraged to provide for themselves methods of resisting the flood by purchasing sand bags as a temporary measure and/or installing more flood resistant measures such as flood boards/gates, wherever practicable and cost effective to do so. Other measures that could be implemented by individuals and or organisations would include the installation of flood resilient fittings and finishes to reduce the impact that a flood would have on the property.

In this way the hazard would remain the same but the risk would be reduced.

Option 2 - Reduction of the Flood Hazard:

It is important to note that it is not possible to reduce the volumes of water precipitation from storms and with the effects of climate change, weather patterns are likely to generate storms which will be more intense and produce greater volumes of precipitation.

In order to reduce the flood hazard it will be necessary to reduce the peak runoff from a given storm and/or reduce the total runoff from a given catchment. This is possible through the use of land management techniques such as the introduction of forestry planting or changes to the felling policies on existing plantations and modifications to farming operations.

New habitats could also be constructed incorporating wetlands or ponds to act as attenuation.

The overall impact would be to reduce the volume and intensity of the runoff. This in turn could reduce the depth of flooding and the depth and velocity of flows downstream thus reducing flood risk.

In addition consideration will be given to improving the maintenance of the existing natural watercourses, culverts and other drainage structures within the Caerphilly County Borough Council area in order to reduce the potential for their capacity to be exceeded.

Option 3 - Enhancement of the Flood Defence System:

Where existing flood defences and drainage structures are found to be inadequate to protect communities, more structured measures could be introduced which would reduce the risk.

Existing flood defences in the form of earth embankments could be increased in height where additional land is available. It may also be possible to increase the height of existing walls, subject to detailed analysis.

New embankments or flood defence walls could also be constructed where flood modelling indicates a specific requirement and cost benefit analysis is positive.

Existing culverts could be made more effective through the construction of new intake grids as it has been found that flooding generally occurs as a result of inadequate intakes rather than lack of capacity in existing culverts.

Where modelling indicates that existing drainage systems lack capacity new larger culverts could be constructed.

Where appropriate, consideration will be given to the construction of attenuation ponds in order to reduce the peak water flows, lower maximum depths of flooding or to reduce velocities of flood water.

Significant external funding would be necessary in order to implement any of these measures.



SUB-STANDARD CULVERT BEING REPLACED

Approach to strategy:

Using the three options given, the following seven approaches have been considered for the implementation of The Strategy

- S1 Consider Option 1 alone - Community Involvement;
- S2 Consider Option 2 alone - Reduction of the Flood Hazard;
- S3 Consider Option 3 alone - Enhancement of the Flood Defence System;
- S4 Consider Option 1 - Community Involvement in combination with Option 2 Reduction of the Flood Hazard – where the measures to implement Option 1 would be considered before the measures to implement Option 2;
- S5 Consider Option 1 - Community Involvement in combination with Option 3 Enhancement of the Flood Defence System – where the measures to implement Option 1 would be considered before the measures to implement Option 3;
- S6 Consider Option 2 Reduction of the Flood Hazard in combination with Option 3 Enhancement of the Flood Defence System – where the measures to implement Option 2 would be considered before the measures to implement Option 3;
- S7 Consider Option 1 - Community Involvement in combination with Option 2 Reduction of the Flood Hazard and Option 3 Enhancement of the Flood Defence System – where the measures to implement Option 1 would be considered before the measures to implement Option 2 and finally measures to implement Option 3 would be considered.

Appraisal of the seven approaches to the strategy:**S1 - Option 1 - Community Involvement:**

Community Involvement on its own has the potential to reduce risk in each of the areas of significant flood risk in the short term. However, with climate change and the construction of new developments the volume of water and the peak flows in a storm of a fixed return period is likely to increase and thus increase risk over a period of time.

This option would not provide a satisfactory outcome where modelling indicates that flood water will be deep and /or fast flowing.

Option 1 on its own would therefore not provide a viable Strategy.

S2 Option 2 Reduction of the Flood Hazard:

Reduction of the Flood Hazard by management of the catchment and the creation of new habitats which would reduce the peak flows from catchments is the most sustainable option and would provide numerous opportunities for bio-diversity and the environmental enhancement of the catchment. However, there are likely to be some catchments where it will not be possible to introduce such measures.

Option 2 on its own would therefore not provide a viable Strategy.

S3 Option 3 Enhancement of the Flood Defence System:

Enhancement of the Flood Defence System could be used in most situations to reduce flood risk. This option however, is likely to be the most expensive and funding would not be available for all measures. As the funding will be prioritised subject to a cost benefit analysis only a limited number of measures could be constructed leaving some areas of significant flood risk with ever increasing risk.

This option is also considered to be the least sustainable.

Option 3 on its own would therefore not provide a viable Strategy.

S4 Combination of Option 1 - Community Involvement and Option 2 Reduction of the Flood Hazard:

This combination is likely to give the most sustainable Strategy. However, there are likely to be locations where Reduction of Flood Hazard would not be possible and Community Involvement alone would not be able to reduce risk sufficiently to combat the ever increasing effect of climate change.

A combination of Option 1 and 2 would therefore not provide a viable Strategy.

S5 Combination of Option 1 - Community Involvement and Option 3 Enhancement of the Flood Defence System:

This combination would be capable of reducing flood risk in each of the areas where significant flood risk has been identified. However, it is unlikely that sufficient finance will be available in order to introduce measures and to enhance all existing flood defence systems found to be inadequate. This combination would also be less sustainable.

A combination of Option 1 and 3 would therefore not provide a viable Strategy.

S6 Combination of Option 2 Reduction of the Flood Hazard and Option 3 Enhancement of the Flood Defence System:

This combination would be capable of reducing flood risk in each of the areas where significant flood risk has been identified. However, it is unlikely that sufficient finance could be found in order to introduce measures to reduce flood hazard or enhance existing flood defence systems. This combination would also be less sustainable.

A combination of Option 2 and 3 would therefore not provide a viable Strategy.

S7 Combination of Option 1 - Community Involvement, Option 2 Reduction of the Flood Hazard and Option 3 Enhancement of the Flood Defence System:

By using a combination of all options it is likely that flood risk could be reduced in all areas where significant flood risk has been identified.

Having all measures available for implementation will give opportunity to use the most sustainable option and to make available less expensive measures which are likely to attract funding through a prioritised cost benefit analysis system.

A combination of Option 1, 2 and 3 would therefore provide the only viable option for our Local Flood Risk Management Strategy.

Strategic Environmental Assessment – analysis:

The Strategic Environmental Assessment analysis has concluded that approach S2 as detailed above is the optimum strategy from an environmental perspective, with alternative S7 being a close second. This is in contradiction to the Authorities Flood Risk Management Team comments above.

In preparing The Strategy environmental issues represent only one perspective along with other major issues such as engineering solutions and value for money. Approach S2 would rule out the use of Community Involvement, which is regarded as being of paramount importance in the implementation of The Strategy and the preparation of the Flood Risk Management Plans and would in many cases be the most economic solution. Enhancement of the Flood Defence System would also be ruled out under approach S2 although there are some flood risk areas where improving the existing flood defences may be the only method of reducing flood risk.

It has therefore been concluded that approach S7 should be the adopted over approach S2 for the development of The Strategy

The Welsh Government Guidance further states that when developing Local Strategies, Lead Local Flood Authorities may wish to consider both high level strategic objectives and more detailed objectives.

In considering its objectives Caerphilly County Borough Council, as the Lead Local Flood Authority, has taken account of the requirements of the National Strategy. The strategic aims and objectives have been translated into meaningful objectives for Caerphilly County Borough Council, focusing on the **Prevention, Protection and Preparedness** (including Climate Adaption) elements.

5.3. Caerphilly County Borough Council detailed objectives which will be adopted as part of the Flood Risk Management Plan.

Caerphilly County Borough Council has set the following detailed objectives as part of the Local Flood Risk Management Strategy. These objectives are Specific, Measurable, Achievable, Reasonable and Time Constrained.

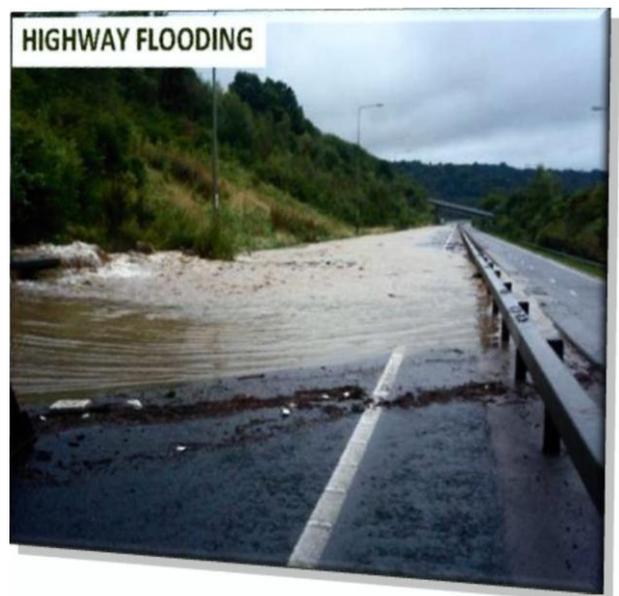
All objectives will be implemented using the most up to date and relevant information available.

All the detailed objectives listed below were developed for the Local Flood Risk Management Strategy and no amendments or additions have been made to those included in the strategy. The objectives have been used to determine which measures should be implemented within this Flood Risk Management Plan in order to make significant progress towards achieving the Caerphilly County Borough Council high level objective.

Overarching Objective 1:

Reduce the consequences for individuals, communities, businesses and the environment from flooding.

- 1 Reduce the number of people exposed to the risk of flooding;
- 2 Reduce the number of residential and commercial properties affected by the risk of flooding;
- 3 Reduce the number of people exposed to risk of flooding of significant depth and velocity;
- 4 Reduce disruption to critical infrastructure or prepare plans to allow the operations to be maintained;
- 5 Protect and enhance Natura 2000;
- 6 Protect and enhance Sites of Special Scientific Interest (SSSIs);
- 7 Protect and enhance Sites of Importance for Nature Conservation (SINCs);
- 8 Contribute to the delivery of Caerphilly Biodiversity Action Plan;
- 9 Minimise damage to known historic areas and sites: Scheduled Ancient Monuments, Listed Buildings, Conservation Areas, Registered Historic Parks and Gardens and Registered Historic Landscapes.



Overarching Objective 2:**Raise awareness of and engaging people in the response to flood.**

- 10 Provide systems to give early warning of potential flooding to individuals and communities;
- 11 Provide efficient systems for the management and maintenance of surface water assets and drainage systems;
- 12 Reduce economic damage;
- 13 Endeavour to reduce cost of management.

Overarching Objective 3:**Provide an effective and sustained response to flood events through.**

- 14 Creating natural channels and water bodies with minimal modifications;
- 15 Improving water quality;
- 16 Providing Flood Risk Management Plans for each area subject to flood risk;
- 17 Ensuring that measures are designed and constructed in a sustainable way;
- 18 Ensuring that Caerphilly County Borough Council works in partnership with all other Risk Partners and works collaboratively with adjacent Authorities.

**DRAINAGE CHANNEL****Overarching Objective 4:****Prioritise investment in the most at risk communities.**

- 19 Ensuring that investment decisions are prioritised in the most at risk communities on a consistent, defensible basis and are subject to cost benefit analysis.

5.4. Summary of the process for the selection and prioritising measures to achieve objectives.

When considering the measures to be used to achieve the objectives the following list of goals (see Caerphilly County Borough Council – Strategy and Flood Risk Management Plan Action Plan) has been developed in order to decide on the priority to be given to each measure.

In addition those measures that satisfy multiple objectives will be given greater priority than those which satisfy only one.

Measures will also be given higher priority if the environmental effects are likely to improve biodiversity and they provide social improvements such as access to the public.

In considering each measure Caerphilly County Borough Council has focused on **Prevention, Protection, Preparedness and Recovery and Review**, including Climate Adaption.

The Welsh Government has also given the following seven high level themes, which have been considered by Caerphilly County Borough Council for the implementation of the strategy

- 1 Development planning and adaptation;
- 2 Flood forecasting, warning and response;
- 3 Land, cultural and environmental management;
- 4 Asset management and maintenance;
- 5 Studies assessment and plans;
- 6 High-level awareness and engagement (to increase individual and community resilience);
- 7 Monitoring (of the local flood risk issues).

Caerphilly County Borough Council has identified a total of 43 measures, which will ensure the delivery of the objectives.

The measures have been identified within three categories namely:

- 1 Prevention of flooding;
- 2 Preparedness for flooding;
- 3 Protection against flooding.

Each measure has been given a time scale for implementation as follows:

- 1 Short term 0 – 20 years;
- 2 Medium term 20 – 50 years;
- 3 Long term 50 – 100 years.

Caerphilly County Borough Council – Strategy and Flood Risk Management Plan Action Plan:

Wherever appropriate soft engineering solutions will be given priority over projects designed using hard engineering. This will apply in particular where new drainage assets and defence structures are built or existing ones modified.

Whilst it is the aspiration of the Strategy to implement the full package of measures together, in reality constraints such as funding, ease of implementation etc will require measures to be implemented as stated below:

- 1 Provide an early warning system to allow residents time to move to a safe area;
- 2 Encourage the residents to produce their own Flood Plans to reduce danger to themselves and damage to their property and its contents;
- 3 Provide systems to prevent floodwater entering the property;
- 4 Endeavour to reduce flood risk by reducing the volume of water being generated by the upstream catchment;
- 5 Introduce new flood relief systems such as culverts or drainage ditches;
- 6 Build new flood defences or raise the level of existing flood defences.

CAERPHILLY COUNTY BOROUGH COUNCIL**LOCAL FLOOD RISK MANAGEMENT STRATEGY
OVERARCHING OBJECTIVES AND DETAILED OBJECTIVES**

Overarching Objective 1: Reducing the impacts on individuals, communities, businesses and the environment				
Detailed Objective		Social	Economic	Environmental
1	Reduce the number of people exposed to the risk of flooding.	√	√	
2	Reduce the number of residential and commercial properties affected by the risk of flooding.	√	√	
3	Reduce the number of people exposed to risk of flooding of significant depth and velocity.	√	√	
4	Reduce disruption to critical infrastructure or prepare plans to allow the operations to be maintained.	√	√	
5	Protect and enhance Natura 2000 Sites.	√		√
6	Protect and enhance Sites of Special Scientific Interest (SSSIs).	√		√
7	Protect and enhance Sites of Importance for Nature Conservation (SINCs).	√		√
8	Contribute to the delivery of Caerphilly Biodiversity Action Plan.	√		√
9	Minimise damage to known historic areas and sites: Scheduled Ancient Monuments, Listed Buildings, Conservation Areas, Registered Historic Parks and Gardens and Registered Historic Landscapes.	√	√	√

Overarching Objective 2: Raising awareness of and engaging people in the response to flood events				
Detailed Objective		Social	Economic	Environmental
10	Provide systems to give early warning of potential flooding to individuals and communities.	√	√	
11	Provide efficient systems for the management and maintenance of surface water assets and drainage systems.	√	√	
12	Reduce economic damage.	√	√	
13	Endeavour to reduce cost of management.		√	

CAERPHILLY COUNTY BOROUGH COUNCIL**LOCAL FLOOD RISK MANAGEMENT STRATEGY
OVERARCHING OBJECTIVES AND DETAILED OBJECTIVES**

Overarching Objective 3: Providing an effective and sustained response to flood events				
Detailed Objective		Social	Economic	Environmental
14	Creating natural channels and water bodies with minimal modifications.	√		√
15	Improving water quality.	√		√
16	Providing Flood Risk Management Plans for each area subject to flood risk.	√	√	√
17	Ensuring that measures are designed and constructed in a sustainable way.		√	√
18	Ensuring that Caerphilly County Borough Council works in partnership with all other Risk Partners and works collaboratively with adjacent Local Authorities.	√	√	√

Overarching Objective 4: Prioritising investment in the most at risk communities				
Detailed Objective		Social	Economic	Environmental
19	Ensuring that investment decisions are prioritised in the most at risk communities on a consistent, defensible basis and are subject to cost benefit analysis.		√	

6. How We Will Manage Flood At A Local Level

6.1. Caerphilly County Borough Council – Flood Risk Area.

Overview:

Caerphilly County Borough Council is a Unitary Authority situated within the valleys of the South East Wales. It has a population of approximately 170,000 and an area of 27,763 hectares. It is of mix of urban communities generally built on steeply sloping hillsides or within the valley basins.

The Caerphilly County Borough Council area is served by three catchments, the Rhymney, Sirhowy and Ebbw, although a small part of the west of the County Borough Council area flows into the Taff catchment. All three rivers rise on the southern edge of the Brecon Beacons before descending steeply through the valleys and then onwards across a flat plain before entering the Severn Estuary to the east of Cardiff.

Each catchment can be divided into two main parts; a steep sided, wet, mountainous upper valley with limited flood plain and short steep tributaries and a flatter wider valley below, the latter are in the Machen area for the River Rhymney and the Risca/Crosskeys area for the Rivers Ebbw and Sirhowy.

Due to the County Borough Council's westerly location and its mountainous nature in addition to its proximity to the sea, the catchments receive a high annual average rainfall. Despite the catchment's altitude, little of this falls as snow. Although the rainfall is throughout the year, the thin sandy soils, the sandstone and the rocks of the coal measures do not retain large quantities of water in storage and therefore provides little base flow support to the watercourses. Consequently the main rivers and tributaries are 'flashy' in nature, with quite rapidly diminishing flows during dry periods, very rapid rises in river levels during heavy storms, albeit during the winter or summer resulting in periodic flooding. The base flows of these rivers has however, reduced since the closure of the coal mines which pumped considerable amounts of underground water in the main river channels.

In addition to the main and ordinary watercourses, there are a range of other water channels and attenuation areas in the Caerphilly County Borough Council area, including the Monmouth Brecon canal, a number of reservoirs and the sewer and drainage network, all of which are susceptible to flooding. The larger reservoirs in Caerphilly County Borough Council, those that impound over 25,000 cubic metres of water, are subject to both discharge consents and annual safety inspections to ensure that the risk of water release does not result in flooding. These reservoirs are mainly located in the Heads of the Valleys area. The canal, which has breached in the past resulting in flooding, is also inspected and for both this and the reservoirs it is considered that there are no significant flood risks associated expressly with these. Tidal flooding is not an issue.

At a communities scale the Caerphilly County Borough Council area is drained through numerous ordinary watercourses. The surface water from the watercourses enters the drainage system through a large number of intakes, some with grids and some without.

These features have been recorded in our Geo Environ Database for drainage structures and are also shown on our Geographic Information System (GIS) package. Other culverts are likely to be found as investigations continue.

Where the drainage system, including the culvert carrying the surface water, is deemed to be significant, these intakes are inspected on a regular basis and when appropriate the intakes are cleared of debris and vegetation to prevent blockages leading to flooding. This is also undertaken as part of the severe weather culvert protocol as these significant intake structures are most likely to block and cause flooding during an intense storm.

If intense rainfall has been forecast these intakes will be inspected as priority and cleaned if necessary and inspections will continue during and after severe weather.

From our experience at Caerphilly County Borough Council, over a period of 25 years, the most likely source of flood is blocked grids at intakes to culverts and therefore there is considerable emphasis in this Flood Risk Management Plan on this aspect of flood risk from surface water.

Conclusions from the Flood Risk Maps:

The Flood Risk for Caerphilly County Borough Council indicates that the main cause of flood risk for the area relates to ordinary watercourses and the intakes to existing surface water culverts. Generally this correlates with the experience gained by the drainage team over past 10 years although it is believed that the risk is overstated, as the full capacity of the existing culverts was not included in the modelling process when the maps were prepared.

COUNTS FOR FLOOD RISK AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	134800	7388	1384	832
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	57362	1143	264	182
Services (n)	769	32	13	5
Risk to Economic Activity				
Non-Residential Properties (n)	9213	836	248	124
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	37	4.3	1.5	1.5
Agricultural Land – Grades 1, 2 and 3 (ha)	1075	63.8	17.1	28.9
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	36	7.0	2.0	1.0
Special Areas of Conservation (SAC) (ha)	39.8	0.2	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	103	3.8	1.0	1.5
Parks and Gardens (ha)	138	0.1	0	0.1
Scheduled Ancient Monuments (ha)	34	2.6	1.2	1.5
Listed Buildings (n)	259	7	4	15
Licensed Abstractions (LA) (n)	9	4	0	3
Sites of Interest for Nature Conservation (SINC) (ha)	2843	90.3	33.2	83

The counts representing flood risk from surface water in Caerphilly County Borough Council may be overstated as they also include properties at risk from river flooding.

Table 05: Flood Risk Area – Counts for Various Risks

Measures and objectives to mitigate flood risk (revenue & capital) covering the whole of the Caerphilly County Borough Council area:

All the measures listed below, for inclusion in this Flood Risk Management Plan, were developed for the Local Flood Risk Management Strategy. Some extra information has been added to give clarity for the implementation of the measure at specific locations.

Measure Location:	WHOLE COUNTY BOROUGH COUNCIL AREA - CCBC01
This measure links with the measure in the Severn River Basin District Flood Risk Management Plan – Raise flood awareness within the community.	
Measure Name:	Raise flood awareness within the community; Engage with community to establish community flood plan(s); Encourage residents to prepare their own individual flood plan.
Measure Type:	M43 - Preparedness; Public awareness and preparedness; Measures to establish the public awareness or preparedness for flood events. M44 – Other measures to establish or enhance preparedness for flood events to reduce adverse consequences.
Measure Location:	Any area within Caerphilly County Borough Council where there is significant risk.
Responsible Authority:	Caerphilly County Borough Council.
Objectives:	1,2,3,10.
Timetable:	2015 – 2021.
Progress Implementation:	Ongoing
Cost:	Cost of Caerphilly County Borough Council staff time to set up the forum and hold quarterly meetings has been included in the measure within the individual community area.
Effects on Risk:	By informing residents of the flood risk to their homes it will allow individuals to be more aware and prepared. It is not possible to give a precise count of the reduction of risk for this measure.

Measure Location:	WHOLE COUNTY BOROUGH COUNCIL AREA – CCBC02
Measure Name:	Investigate feasibility for new flood warning system.
Measure Type:	M41- Preparedness, flood forecasting and warning; Measures to establish or enhance a flood forecast or warning system.
Measure Location:	Any area within Caerphilly County Borough Council where there is significant risk.
Responsible Authority:	Caerphilly County Borough Council.
Objectives:	10.
Timetable:	2015 – 2021.
Progress Implementation:	Not Started.
Cost:	Cost of Caerphilly County Borough Council staff time to investigate and set up the early warning system. The cost of implementation has been put against the measures within the community area plans.
Effects on Risk:	By informing residents of the flood risk to their homes it will allow individuals to be more aware and prepared. It is not possible to give a precise count of the reduction of risk for this measure.

Measure Location: WHOLE COUNTY BOROUGH COUNCIL AREA – CCBC03

Survey work identified within the Local Flood Risk Management Strategy as listed below:

1. Where land containing Sites of Special Scientific Interest (SSSI's) or Sites of Interest for Nature Conservation (SINC's) is identified as being subject to flood risk, surveys and reports will be carried out to identify the potential damaging effects of flooding and what measures could be implemented to reduce to flood risk;
2. Survey of water bodies with area greater than 2000m²;
3. Additional information required for the database and Geographic Information System layers;
 - Calculation of capacity of each culvert and determine details of the catchment served
 - Identification of intake structures below current Natural Resources Wales standards, which will need to be upgraded
 - Identification of all owners and their contact details
 - Current condition of each significant culvert
4. Identify and survey all features, which act as flood defence structures;
5. Survey all channels, which are considered to be significant;
6. Survey all culverts, which are considered to be significant in terms of flood risk. The surveys will identify details of the construction materials, size and shape of the culvert and its condition;
7. Further survey work and site investigations will be carried out in order to improve the accuracy and completeness of the information available regarding contaminated land within areas subject to significant flood risk;
8. Surveys will be carried out to establish what measures will be required in order to provide additional resistance to flood water affecting Historic Assets including Scheduled Ancient Monuments and Historic Listed Buildings;
9. A survey will be carried out to identify where leachate is being discharged from refuse tips both current and historic and from cemeteries. The nature of the leachate will be established and its affect on the quality of surface water;
10. A survey will be carried out of all groundwater discharges from all mine workings to establish the location and quality of the water;
11. A survey will be implemented in order to establish a list of the defences within the Caerphilly County Borough Council area, including details of their construction and condition;
12. Topographical surveys will be carried out to allow construction schemes to be designed as part of the Flood Risk Management Plans.

Measure Name:

Measure Location:	WHOLE COUNTY BOROUGH COUNCIL AREA – CCBC03 cont'd/...
Measure Type:	M24 - Prevention; Other measures to enhance flood risk prevention, (may include flood risk modelling and assessment, flood vulnerability assessment, maintenance programmes or policies etc). M44 – Preparedness; Other preparedness; Survey work as listed in the Caerphilly County Borough Council Local Flood Risk Management Strategy.
Measure Location:	Whole Caerphilly County Borough Council Area.
Responsible Authority:	Caerphilly County Borough Council.
Objectives:	11.
Timetable:	2015 – 2021.
Progress Implementation:	Not Started.
Cost:	Cost of Caerphilly County Borough Council staff time to carry out these investigations and for the use of specialist sub-contractors has been included in the measure within the individual community area.
Effects on Risk:	The gathering of the information will not reduce flood risk but will enable measures to be designed, which will reduce flood risk in the future.

Measure Location	WHOLE COUNTY BOROUGH COUNCIL AREA – CCBC04
This measure links with the measure in the Severn River Basin District Flood Risk Management Plan – Undertake initial assessment and feasibility work for reducing flood risk.	
Measure Name	Identify the extent and characteristic of each catchment and the details and condition of the existing drainage system. Calculate surface water runoff, check the intake and culvert capacity of the existing system and design a replacement system if necessary. Design of flood alleviation schemes where necessary.
Measure Type	M24 – Prevention; Measure to enhance flood risk prevention including; flood risk modelling and assessment, flood vulnerability assessment and maintenance programmes.
Measure Location	All significant intake and associated culverts
Responsible Authority	Caerphilly County Borough Council as Lead Local Flood Authority and riparian owners.
Objectives	1,2,3,4.
Timetable	2015 – 2021.
Progress Implementation	Not Started.
Cost	Cost of Caerphilly County Borough Council staff time to carry out these investigations and for the use of specialist sub-contractors has been included in the measure within the individual community area.
Effects on Risk	The study itself will not reduce flood risk but will indicate if the risk has been over stated. Further measures may be identified as a result of the investigation, which could reduce flood risk in the area. The potential for risk reduction has been included within the measure for the individual areas.

Measure Location	WHOLE COUNTY BOROUGH COUNCIL AREA – CCBC05
This measure links with the measure Severn River Basin District Flood Risk Management Plan – Undertake initial assessment and feasibility work for reducing flood risk.	
Measure Name	Carry out topographical surveys and study of areas where flood risk is caused by the accumulation of surface water. Investigate drainage paths to and from the area of flood risk. Investigate alternate proposals for the reduction of flood risk.
Measure Type	M24 – Prevention; Measure to enhance flood risk prevention including; flood risk modelling and assessment, flood vulnerability assessment and maintenance programmes.
Measure Location	Locations are identified in the individual plan for community areas.
Responsible Authority	Caerphilly County Borough Council as Lead Local Flood Authority and land owners.
Objectives	1,2,3,4.
Timetable	2015 – 2021.
Progress Implementation	Not Started.
Cost	Cost of Caerphilly County Borough Council staff time to carry out these investigations and for the use of specialist sub-contractors has been included in the individual community area.
Effects on Risk	The study itself will not reduce flood risk but will indicate if the risk has been over stated. Further measures may be identified as result of the investigation, which could reduce flood risk in the area. The potential for risk reduction has been included within the measure for the individual community areas.

Measures currently being used by Caerphilly County Borough Council to manage flood risk:

These measures, covering the whole of Caerphilly County Borough Council, were included in the Local Flood Risk Management Strategy – These measures and objectives will be adopted as part of the Flood Risk Management Plan - For the full details of the measures see Appendix 2.

CCBC06:	Sustainable and Strategic Development Planning - Local Flood Risk Management Strategy Clause 6.13.1.
Code/Category/Type:	M21: Prevention: Avoidance; Measure to prevent location of new or additional receptors in flood prone areas, such as land use planning policies or regulation.
Objectives:	1, 2, 3, 4, 5, 6, 7, 8, 14, 15, 17.
Timescale:	Ongoing.
CCBC07:	Strategic Flood Risk Assessment (SFRA)/Strategic Flood Consequence Assessment (SFCA) – Local Flood Risk Management Strategy Clause 6.13.2.
Code/Category/Type:	M21: Prevention: Avoidance; Measure to prevent the location of new or additional receptors in flood prone areas such as land use planning policies or regulation. M23: Prevention; Reduction; Measures to adapt receptors to reduce the adverse consequences in the event of a flood actions or buildings, public networks, etc.
Objectives:	1, 2, 3, 4, 12.
Timescale:	Ongoing.
CCBC08:	Relocation – Local Flood Risk Management Strategy Clause 6.13.4.
Code/Category/Type:	M22: Prevention; removal or relocation; Measure to remove receptors from flood prone areas; or to relocate receptors areas of lower probability of flooding and or lower hazard.
Objectives:	1, 2, 3, 4 12, 13.
Timescale:	Ongoing.
CCBC09:	Sustainable Drainage – Local Flood Risk Management Strategy Clause 6.13.7.
Code/ Category/Type:	M34: Protection, surface water management; measures involving physical interventions to reduce surface water flooding, typically, but not exclusively, in an urban environment, such as enhancing artificial drainage capacity or though sustainable drainage systems (SuDS).
Objectives:	1, 2, 3, 4, 14, 15, 17.
Timescale:	Ongoing.
CCBC10:	Flood Awareness – Local Flood Risk Management Strategy – Clause 6.14.2.
Code/Category/Type:	M43: Preparedness; Public awareness and preparedness for flood events.
Objectives:	1, 2, 3, 4, 9, 10, 12, 13.
Timescale:	Ongoing.

CCBC11:	Flood Warning – Local Flood Risk Management Strategy – Clause 6.14.3.
Code/Category/Type:	M41: Preparedness; Flood forecasting and warning; Measures to establish or enhance a flood forecasting or warning system.
Objective:	1, 2, 3, 4, 9, 10, 12, 13.
Timescale:	Ongoing.
CCBC12:	Flood Forecasting - Local Flood Risk Management Strategy – Clause 6.14.4.
Code/Category/Type:	M41: Preparedness; Flood forecasting and warning; Measures to establish or enhance a flood forecasting or warning system.
Objectives:	1, 2, 3, 4, 9.
Time Scale:	Ongoing.
CCBC13:	Emergency Response Plans – Local Flood Risk Management Strategy – Clause 6.14.5.
Code/Category/Type:	M42: Preparedness; Emergency Event; Measures to establish or enhance flood event institutional emergency response planning.
Objective:	1, 2, 3, 4, 9, 10, 13.
Time scale:	Ongoing.
CCBC14:	Community Flood Plan – Local Flood Risk Management Strategy – Clause – Clause 6.14.6.
Code/Category/Type:	M42: Preparedness; Emergency Event; Measures to establish or enhance flood event institutional emergency planning.
Objective:	1, 2, 3, 4, 9, 10, 13.
Time scale:	Ongoing.
CCBC15:	Land Management – Local Flood Risk Management Strategy – Clause 6.15.1.
	This measure links with the River Basin Management Plan for the River Severn Basin District – Table 9 Physical modifications – Measure 6 - Vegetation management and Table 14 Manage pollution from rural areas – Measure 3 – Sustainable woodland and forestry management.
Code/Category/Type:	M31: Protection; Natural flood management/run off and catchment management; Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and or storage, enhancement of infiltration, etc and including in-channel, flood plain works and the reforestation of banks, that restore natural systems to help slow flow and store water.
Objectives:	1, 2, 3, 4, 5, 6, 7, 8, 12, 13, 15, 18.
Time Scale:	Ongoing.
CCBC16:	Resilience – Local Flood Risk Management Strategy – Clause – 6.15.2.
Code/Category/Type:	M23: Prevention; Reduction; Measures to adapt receptors to reduce the adverse consequences in the event of a flood actions or buildings, public networks, etc.
Objectives:	6, 7, 8, 14.
Time Scale:	Ongoing.

CCBC17:	Resistance – Local Flood Risk Management Strategy – Clause – 6.15.3.
Code/Category/Type:	M23: Prevention; Reduction; Measures to adapt receptors to reduce the adverse consequences in the event of a flood actions or buildings, public networks, etc.
Objectives:	6, 7, 8, 14.
Time Scale:	Ongoing.
CCBC18:	Restoration – Local Flood Risk Management Strategy – Clause 6.15.4.
Code/Category/Type:	M52: Recovery and Review; Environmental Recovery; Clean up and restoration activities (with several sub topics as mould protection, well-water safety and securing hazardous material containers).
Objectives:	6, 7, 14, 15.
Time Scale:	Ongoing.
CCBC19:	Environmental Enhancements – Local Flood Risk Management Strategy – Clause 6.15.5.
	This measure links with the River Basin Management Plan for the Severn River Basin District – Table 13 – Manage invasive non-native species – Measure 2 Mitigation, control and eradication (to reduce extent).
Code/Category/Type:	M23: Prevention; Reduction; Measures to adapt receptor to reduce the adverse consequences in the event of a flood actions or buildings, public network, etc.
Objectives:	6, 7, 14, 15, 17.
Time Scale:	Ongoing.
CCBC20:	System Asset Management – Local Flood Risk Management Strategy Clause 6.16.1.
Code/Category/Type:	M44: Preparedness; Other preparedness; Other measures to establish or enhance preparedness for flood events to reduce adverse consequences.
Objectives:	11,13.
Time Scale:	Ongoing.
CCBC21:	Defence/Structure Management – Local Flood Risk Management Strategy Clause 6.16.2.
Code/Category/Type:	M32: Protection; Water flow regulation; Measures involving physical intervention to regulate flows, such as construction modification or removal of water retaining structures (e.g. dams or other on-line storage areas or development of existing flow regulation rules), which have significant impact on the hydrological regime.
Objectives:	1, 2, 3, 4, 9, 11, 12, 13.
Time Scale:	Ongoing.

CCBC22: Channel Maintenance and New Construction – Local Flood Risk Management Strategy Clause 6.16.3.

This measure links with the River Basin Management Plan for the Severn River Basin District – Table Physical modifications – Measure 3 – Improvement to channel/bed and/ or banks and Table 12 – Improve the natural flow and level of water – Measure 2 Improvement to condition of channel/bed and or banks.

Code/Category/Type: **M33:** Protection; Channel and floodplain works; Measures involving physical inventions to freshwater channels, mountain streams estuaries and flood prone areas of land, such as construction, modification or removal of structures or the alteration of channels, sediment dynamics management, dykes etc.

Objectives: 1, 2, 3, 4, 14.

Time Scale: Ongoing.

CCBC23: Culverts, Gullies, Highway and Culvert Infrastructure Maintenance and New Construction – Local Flood Risk Management Strategy – Clause 6.16.4.

This measure links with the River Basin Management Plan for the Severn River Basin District – Table 9 Physical modifications – Measure 2 – Removal or modification of engineering structure.

Code/Category/Type: **M33:** Protection; Channel and floodplain works; Measures involving physical inventions to freshwater channels, mountain streams estuaries and flood prone areas of land, such as construction, modification or removal of structures or the alteration of channels, sediment dynamics management, dykes etc.

Objectives: 1, 2, 3, 4, 12, 13, 17.

Time Scale: Ongoing.

CCBC24: Investigations – Local Flood Risk Management Strategy Clause 6.17.1.

This measure links with the River Basin Management Plan for the Severn River Basin District – Table 9 Physical modifications – Measure 10 – Complete first cycle investigations.

Code/Category/Type: **M44:** Preparedness; Other preparedness; Other measures to establish or enhance preparedness for flood events to reduce adverse consequences.

Objectives: 16.

Time Scale: Ongoing.

CCBC25: Local Property-Level Flood Mitigation – Resilience – Local Flood Risk Management Strategy – Clause 6.17.4.

Code/Category/Type: **M44:** Preparedness; Other preparedness; Other measures to establish or enhance preparedness for flood events to reduce adverse consequences.

Objectives: 12.

Time Scale: Ongoing.

CCBC26:	Local Property-Level Flood Mitigation – Resistance – Local Flood Risk Management Strategy – Clause 6.17.5.
Code/Category/Type:	M44: Preparedness; Other preparedness; Other measures to establish or enhance preparedness for flood events to reduce adverse consequences.
Objectives:	1, 2, 3, 4, 12.
Time Scale:	Ongoing.
CCBC27:	Pre-feasibility Studies, Feasibility Studies – Local Flood Risk Management Strategy – Clause 6.17.6.
Code/Category/Type:	M44: Preparedness; Other preparedness; Other measures to establish or enhance preparedness for flood events to reduce adverse consequences.
Objectives:	16
Time Scale:	Ongoing.
CCBC28:	Project Plans – Local Flood Risk Management Strategy – Clause 6.17.7.
Code/Category/Type:	M44: Preparedness; Other preparedness; Other measures to establish or enhance preparedness for flood events to reduce adverse consequences.
Objectives:	16
Time Scale:	Ongoing.

Strategic Environmental Assessment and Habitat Regulations Assessment:

All the detailed objectives and measures contained in this Flood Risk Management Plan were included in the Strategy and therefore the Strategic Environmental Assessment and Habitat Regulations Assessments, which was prepared for the Strategy, is still valid. It has not been considered necessary to review the Strategic Environmental Assessment or Habitat Regulations Assessment.

No Physical work will be constructed on site as part of this Flood Risk Management Plan but investigative work may highlight works which are necessary. Should that be the case a review of the Strategic Environmental Assessment will be carried out on a site by site basis.

[Link to Strategic Environmental Assessment and Habitat Regulations Assessment](#)



Number of Measures in each Category

**TOTAL COST OF MEASURES FOR THE
CAERPHILLY COUNTY BOROUGH COUNCIL FLOOD RISK AREA**

COMMUNITY AREA	COST
Aberbargoed	£74,500
Abercarn	£107,000
Bargoed	£61,000
Bedwas	£262,500
Blackwood	£101,500
Caerphilly East	£84,500
Caerphilly North	£96,500
Caerphilly South	£137,500
Caerphilly West	£229,500
Cefn Fforest	£60,500
Crosskeys	£96,000
Crumlin	£148,000
Llanbradach	£65,500
Maesycwmmmer	£174,500
Markham	£47,000
Newbridge	£197,000
Pengam	£50,500
Penmaen	£117,000
Pontllanfraith	£152,000
Pontymister East	£56,000
Pontymister West	£62,000
Trethomas	£85,500
Ystrad Mynach	£177,500
ESTIMATED TOTAL COST:	£2,644,000

In order for the Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council, on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Ring fenced funding has been received from Welsh Government for each of the financial years April 2010 to March 2015.

This funding has been used to prepare the Preliminary Flood Risk Assessment, the Local Flood Risk Management Strategy and this Flood Risk Management Plan. Funding has also been used to develop a database and Geographic Information System for the drainage assets and to carry out some implementations of measures identified.

It is anticipated that funding will also be provided by Welsh Government for the continued implementation of the responsibilities laid on Lead Local Flood Authorities under the Flood and Water Management Act 2010.

Options for further funding will also be investigated by Caerphilly County Borough Council as listed below:

Public funding

Funding through the Community Infrastructure Levy:

The Community Infrastructure Levy came into force in April 2010 and provides Caerphilly County Borough Council with an alternative source of potential funding for flood defence schemes. It allows Caerphilly County Borough Council to raise funds from new development in their area in order to pay for the impact that the development has on local infrastructure.

Funding through the European Union:

European Union funding is available through the Interreg scheme. As surface water management plans are created across study areas, options proposals from these reports will be used to inform future proposals to the European Regional Development Fund.

Private funding

Section 106 funding – Developer Contributions:

Section 106 of the Town and Country Planning Act 1990 allows a local planning authority, such as Caerphilly County Borough Council, to enter an agreement with a landowner or developer in association with the granting of planning permission.

Water Company Funding:

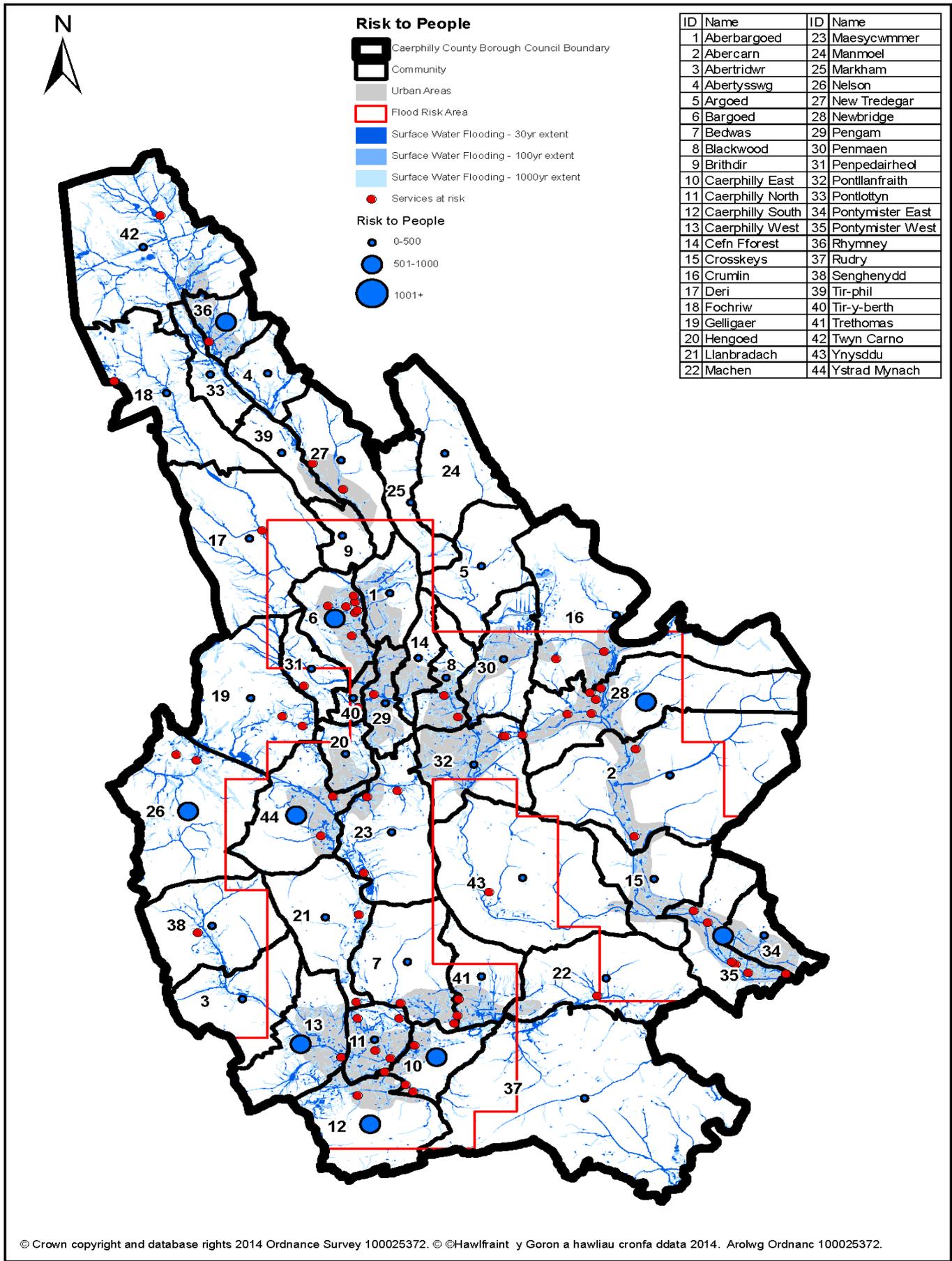
Water companies invest money in flood alleviation schemes as part of their duties to remove properties from the DG5 register (DG5 is a level of service indicator which examines a water company's performance in respect of internal sewer flooding of properties). Sometimes the most effective way to do this is to work in partnership with risk management authorities on flood alleviation schemes in other areas, which can help reduce surface water pressure downstream.

Local fundraising

In addition to contributions from developers, another important funding mechanism may come in the form of local fundraising from local communities and businesses that stand to benefit from the proposed flood defence schemes.

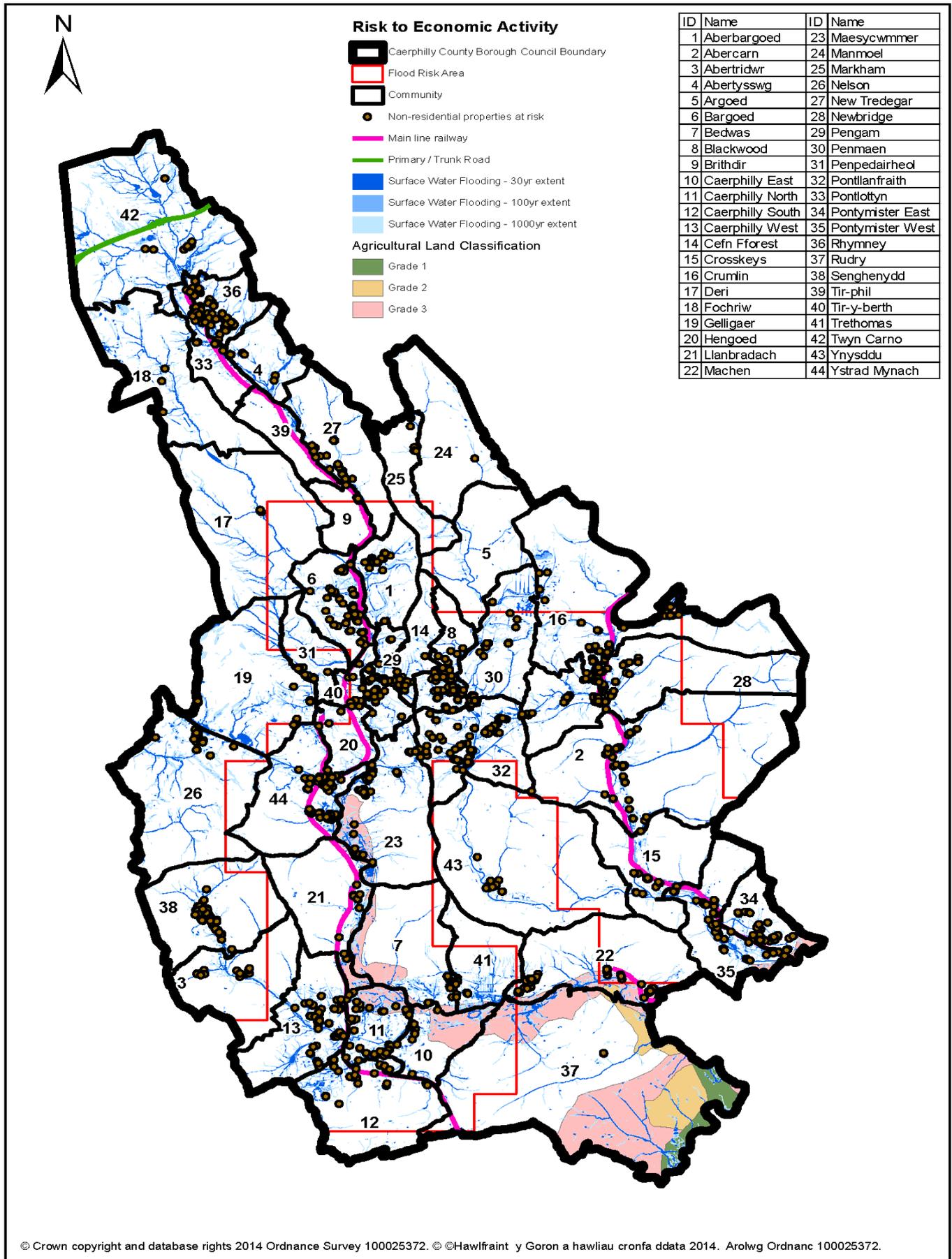
Other sources of funding

In areas prone to flooding, where potential mitigation schemes are identified, Caerphilly County Borough Council will endeavour to liaise with the local Federation of Small Businesses (FSB) to assist in putting together funding to support projects. While the FSB will not have a significant budget, its support can be used to raise local business support.



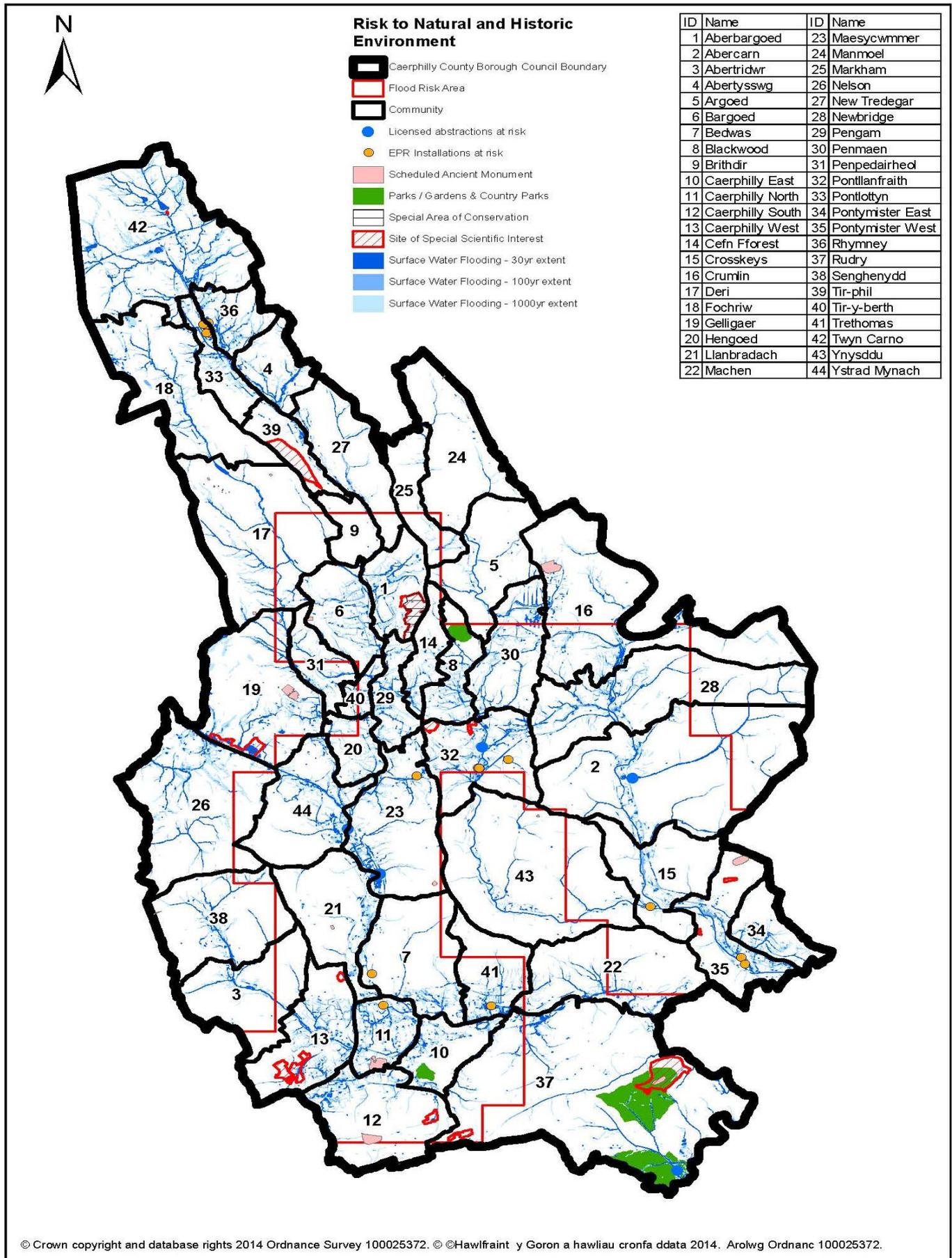
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Figure 07: Caerphilly County Borough Council – Flood Risk Map – Risk to People



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Figure 08: Caerphilly County Borough Council – Flood Risk Map – Risk to Economic Activity



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Figure 09: Caerphilly County Borough Council – Flood Risk Map – Risk to Natural and Historic Environment

Links to documents referred to in this Flood Risk Management Plan:

[Links to Local Development Plan](#)

[Link to the Preliminary Flood Risk Assessment](#)

[Link to Local Flood Risk Management Strategy](#)

Joint schemes with other risk management authorities or stakeholders:

Currently there are no joint schemes planned with other Risk Management Authorities or stakeholders.

6.2. Aberbargoed Community Area.

Overview:

The Aberbargoed community is situated towards the north of the Caerphilly County Borough Council area and includes the town Aberbargoed. It covers an area of approximately 3.4km², around one third of which is urban with the remainder largely open fields. The existing development is mainly residential with the exception of the Bowen Industrial Estate which is situated to the south. Neighbouring communities are New Tredegar, Markham, Argoed, Cefn Fforest, Pengam, Bargoed, and Brithdir.

The River Rhymney flowing north to south forms the western boundary of Aberbargoed. A number of un-named watercourses flow east to west through Aberbargoed before joining the River Rhymney. The entire catchment drains to the west towards the River Rhymney. It is assumed the residential areas are drained via the local sewer network or culverted watercourses discharging to the River Rhymney or its tributaries. The River Rhymney is designated as a main river and therefore is the responsibility of Natural Resources Wales.

Sources of flooding:

The available information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, and flooding from ordinary watercourses is the main source of flooding in Aberbargoed and potentially affects a number of properties. Flooding from main rivers is less extensive and the Natural Resources Wales Flood Map indicates this type of flooding generally affects undeveloped land adjacent to the river and a dismantled railway nearby. However, it is noted that an ambulance station is shown within the River Rhymney floodplain. There are no flood defences present on the River Rhymney in this area.

Available data:

The following flood risk information is currently available for Aberbargoed:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties, particularly in the north of the community. Several areas are shown at high risk with wider areas shown at medium/low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies and these incidents suggest the drainage system may have insufficient capacity to cope with rarer storms. This may be exacerbated when water levels in the River Rhymney and its tributaries are higher.

Ordinary Watercourses – Flooding from ordinary watercourses generally affects undeveloped land. Some developed areas in the vicinity of ordinary watercourses are shown at risk of flooding, potentially affecting properties. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 06 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Lewis Street	Significant surface water flow path shown. Incidents (blocked drains) reported	2	Y
Coedymoeth Road	Significant surface water flow path shown. Incidents (blocked drains) reported	2	Y
Pavilion nr Sannan Street	Significant surface water flow path shown. Incidents (blocked drains) reported	1	Y
Pengam Road	Some incidents reported downstream, however limited flooding is shown on the surface water flood map	2	Y

Table 06: Important Culverts - Aberbargoed

Groundwater – The majority of Aberbargoed is shown to have low susceptibility to groundwater flooding, based on the underlying geology (or is unclassified). There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Parts of the Caerphilly County Borough Council area were identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register, however this does not include the Aberbargoed community.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks in the west of Aberbargoed where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Aberbargoed relate to surface water flooding, where the local drainage system is not effective in capturing runoff and ordinary watercourses. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The western boundary of the Aberbargoed is at risk from flooding from the River Rhymney. Table 07 summarises the impacts of local flooding in Aberbargoed, based on the surface water flood map. Figure 10 shows the Flood Risk Map.

COUNTS FOR ABERBARGOED COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3666	110	19	14
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	1560	6	2	0
Services (n)	17	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	273	9	3	2
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	2	0	0	0
Special Areas of Conservation (SAC) (ha)	39.8	0.2	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	42.6	0.3	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	3	1	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	24.3	0.8	0.3	1.2

Table 07: Impacts of Flooding in Aberbargoed - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

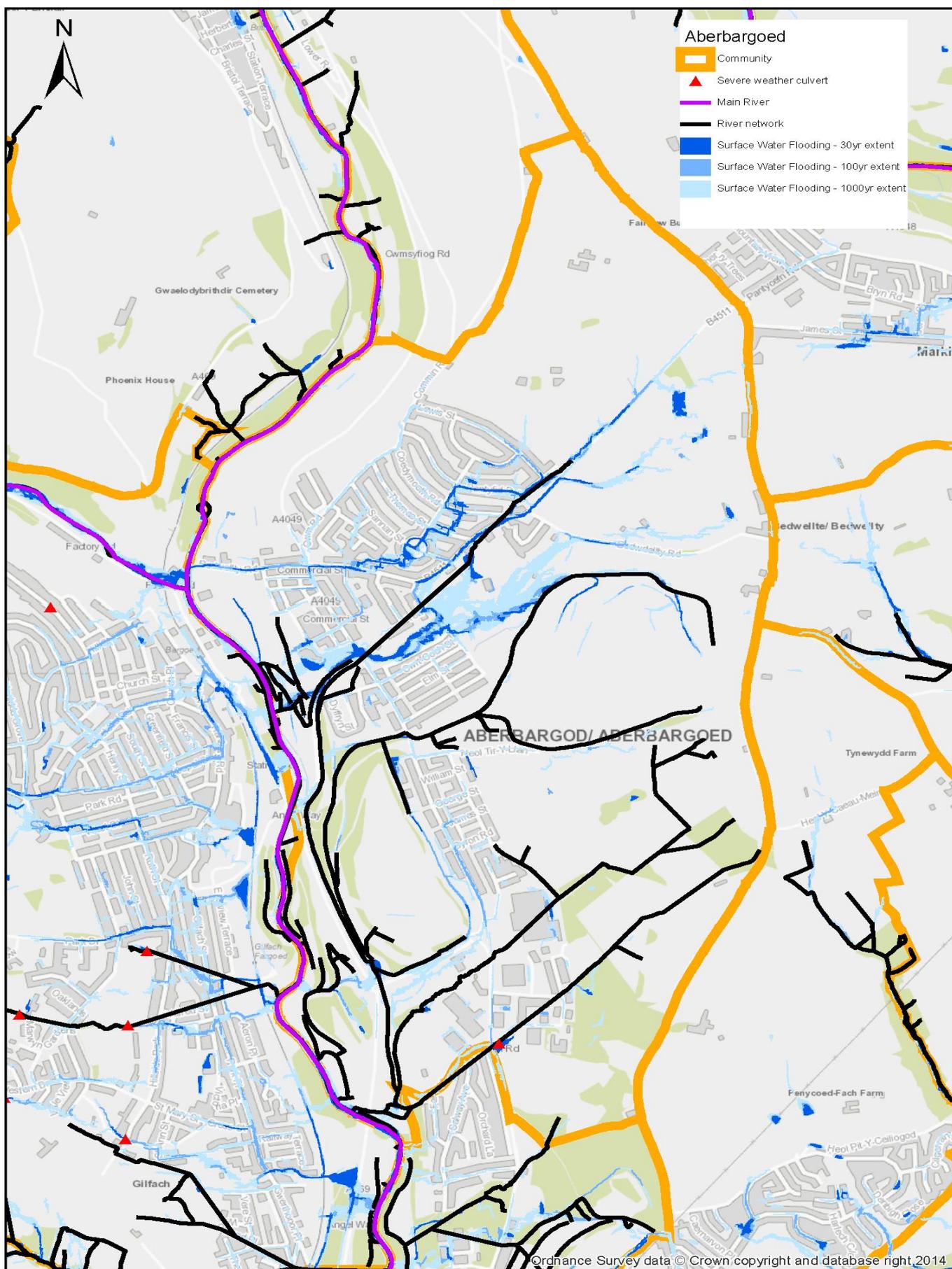


Figure 10: Flood Risk Map for Aberbargoed

The main flood risks have been identified as follows:***Highfield Crescent/Bedwellty Road area:***

There is a medium to high risk of flooding in this area potentially affecting roads and properties. Flooding in this area is likely due to blockages in the drainage system or limited capacity, however flooding from the ordinary watercourse flowing near Bedwellty Road may also contribute to flood risk in this area. A comprehensive assessment of the drainage system is required to better quantify the risk. Further investigations are proposed.

Commercial Street Area:

There is a high risk of flooding in this area affecting roads and green open spaces. This is more than likely due to a combination of flooding from the local drainage network and ordinary watercourses. Although a significant area is within a low risk flood area, only a small number of properties are potentially at risk with the main impacts likely to be disrupted access. Further investigations are proposed.

Bowen Industrial Estate:

The surface water flood maps indicate that the south east corner of Bowen Industrial Estate is within a high risk area. Flooding in this area is likely to be caused by blockages or the inadequate capacity of the culvert at Pengam Road. The area shown at risk is quite small, however flood incidents have been reported in the area. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Aberbargoed.

ABERBARGOED - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
AB01 Community Flood Plan – Investigate and establish local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
AB02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 06 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
AB03 CCTV survey of priority culverts identified in task AB02. Capacity check of priority culverts identified in task AB02.	0 – 5 (2015-2021)	£1k (< £100k)	M24	CCBC03 CCBC04
AB04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
AB05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

ABERBARGOED - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
AB06	Undertake a local community consultation exercise to improve understanding of flooding issues, causes and impacts and inform response plans.	0 – 2 (2015–2021)	£2.5k (<£100k)	M24 / M44/ M53	CCBC10
AB07	Use the outcomes from task AB02, AB03, AB05 & AB06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems and ordinary watercourses in the Highfield Crescent/Bedwellty Road area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
AB08	Use the outcomes from task AB02, AB03, AB05 & AB06 to assess the requirement for and scope of studies to reduce flooding from the ordinary watercourse crossing Commercial Street. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
AB09	Assess the need for & install trash screen/inlet monitors at key culverts (Commercial Street & Pengam Road).	0 – 2 (2015–2021)	£10k (2 sites) (<£100k)	M41 / M42	CCBC25
AB10	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (flood depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
ABERBARGOED COMMUNITY AREA:**

£74,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
7 Preparing	3 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



INTAKE STRUCTURE AT ABERBARGOED

6.3. Abercarn Community Area

Overview:

Abercarn is situated towards the east of the Caerphilly County Borough Council area. It covers a largely rural area of approximately 16.5 km². The main settlement of Abercarn is located alongside the River Ebbw which flows north to south. The remainder of the community consists mainly of steep wooded valleys. Neighbouring communities are Newbridge, Pontllanfraith, Ynysddu and Crosskeys.

The catchment to the east of Abercarn is drained by the Nant Hafod Fach, Nant Gwyddon and Nant Carn. These all flow in a predominantly westerly direction to discharge into the River Ebbw. The catchment to the west of Abercarn is drained by the Nant Pennar and Nant y Crochan, also discharging to the River Ebbw. The very western edge of the community drains into the neighbouring community of Pontllanfraith.

Sources of flooding:

The main source of flooding in Abercarn is the River Ebbw which, according to the Natural Resources Wales Flood Map, affects several industrial and recreational areas adjacent to the river. The River Ebbw is designated main river under the jurisdiction of Natural Resources Wales. The available data indicates flooding from ordinary watercourses is less extensive, but problems may occur in more isolated locations, for example due to culvert constrictions or interaction with the River Ebbw.

Available data:

The following flood risk information is currently available for Abercarn:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Details of a flood alleviation/culvert upgrade scheme at Pant y Resk;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding is mostly associated with the ordinary watercourses. Some flood risk areas are shown along local roads, however these are generally low to medium risk and do not appear to affect significant numbers of properties. Many of the reported flood incidents relate to blocked gullies which may exacerbate surface water flooding in urban areas.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, potentially affecting properties. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 08 shows important culverts that have been identified from the 'Severe Weather Culvert Register' and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Brook Street.	The surface water flood map indicates flooding could affect the A467 and properties in the vicinity.	2	Y
Pant Y Resk.	This is a severe weather culvert. Recent scheme in upper reach. Surface water flood map indicates flooding could affect an extended area in West End.	2	Y
Nant Gwyddon pond outlet.	Outlet from storage pond. Flooding could affect properties and main roads in vicinity of Bridge Street.	3	Y
High Street culvert.	Flooding could affect properties and main roads in vicinity of Bridge Street.	1/2	Y
York Place, Cwmcarn.	This is a severe weather culvert. The surface water flood map indicates limited flooding. No reported incidents.	3	N
Feeder Row, Cwmcarn (rear of 2 Bernard Street).	This is a severe weather culvert. The surface water flood map indicates limited flooding except on open ground. Few incidents.	3	N
Feeder Row, Cwmcarn.	This is a severe weather culvert. The surface water flood map indicates limited flooding except on open ground. Few incidents.	3	N
Feeder Row, Cwmcarn.	The surface water flood map indicates limited extent of flooding, however incidents reported in the vicinity.	2	Y
Cwmcarn Forest Drive.	Outlet from storage pond. The surface water flood map indicates limited flooding.	3	N

Table 08: Important Culverts - Abercarn

Groundwater – Large parts of Abercarn are shown to have some susceptibility to groundwater flooding based on the underlying geology. However, within each grid square the proportion considered susceptible is low (<25%). There are several old coal mine shafts in Abercarn which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Abercarn was not identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register.

Interaction with main river – There is likely to be some interaction with the River Ebbw, particularly in the lower reaches of the ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusion from maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Abercarn relate to ordinary watercourses, particularly constrictions at culverts, or where the local drainage system is not effective in capturing runoff. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies or culverts. Many of the areas affected are also at risk from flooding of the River Ebbw. Table 09 summarises the impacts of flooding in Abercarn, based on the surface water flood map. Figure 11 shows the Flood Risk Map for Abercarn.

COUNTS FOR ABERCARN COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	5581	96	45	16
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	2375	21	13	3
Services (n)	27	2	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	504	30	9	3
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	3.7	0.3	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	4	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.2	0	0	0
Listed Buildings (n)	14	0	0	0
Licensed Abstractions (LA) (n)	2	0	0	1
Sites of Interest for Nature Conservation (SINC) (ha)	713.3	9.2	4.5	11.1

Table 09: Impacts of Flooding in Abercarn - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

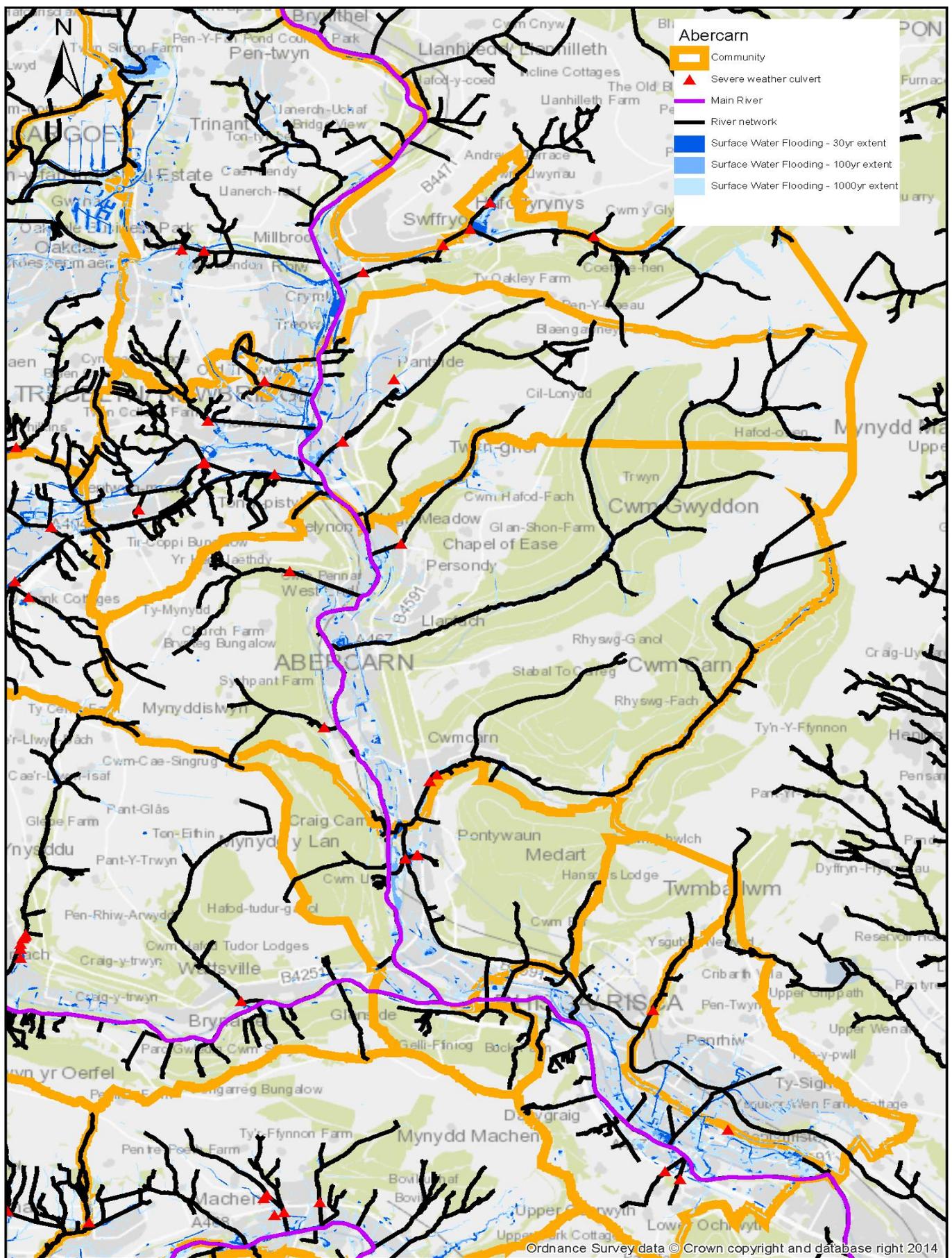


Figure 11: Flood Risk Map for Abercarn

The main flood risks have been identified as follows:***Brook Street area:***

There is a medium to high risk of flooding in this area affecting main access routes, a school and potentially residential properties. This is likely to occur due to a blockage of drainage gullies and the Brook Street/High Street culvert, the capacity of which is unknown. Further investigations are proposed.

West End area:

There is a low to medium risk of flooding in this area, possibly affecting residential properties. This is likely to occur due to the local drainage system not having sufficient capacity to intercept runoff during extreme events and exacerbated by blocked gullies. Flooding upstream of the Pant y Resk culvert intake could also affect this area. A recent scheme has been completed to replace part of the culvert, designed to a 100 year standard of protection, however the capacity of the downstream culvert is not known. Further investigations are proposed.

Bridge Street/High Street Area:

There is a high risk of flooding in this area affecting commercial properties and access routes. The area affected is also within the floodplain of the River Ebbw. The capacity of the culvert is unknown, however incidents suggest it may be undersized. The discharge capacity of the culvert will likely be affected by levels in the River Ebbw.

Other areas shown at risk of flooding from the River Ebbw (not specifically addressed in this strategy) include: non residential properties in the vicinity of Bridge Street, Darren Drive and Chapel Farm Terrace, the school, sewage treatment plant and recreational areas adjacent to the river.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Abercarn.

ABERCARN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
AC01 Community Flood Plan – Investigate and establish local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
AC02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 08 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
AC03 CCTV survey of priority culverts identified in task AC02. Capacity check of priority culverts identified in task AC02.	0 – 5 (2015–2021)	£2.5k (< £100k)	M24	CCBC03 CCBC04
AC04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

ABERCARN - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
AC05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
AC06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
AC07	Use the outcomes from task AC02, AC03, AC05 & AC06 to assess the requirement for and scope of studies to reduce flooding from the Nant Hafod Fach, Nant Pennar and Nant Gwyddon. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£75k (3 sites) (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
AC08	Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on un-named watercourses.	0 – 2 (2015–2021)	£15k (3 sites) (< £100k)	M41 / M42	CCBC25
AC09	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
AC10	Assess flood risks to the listed buildings at high risk and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£1K (< £100k)	M23	CCBC03

**TOTAL COST OF MEASURES FOR
ABERCARN COMMUNITY AREA:
£107,000**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**CASCADE AND INTAKE STRUCTURE
AT ABERCARN**

6.4. Bargoed Community Area

Overview:

The Bargoed community is situated towards the north west of the Caerphilly County Borough Council area and includes the town of Bargoed. It covers an area of approximately 3.7 km², which is largely developed in the east and open fields and farmland in the west. Much of the existing development is residential although there are also likely to be a number of small business and commercial properties and other non-residential properties and services. Neighbouring communities are Deri, Brithdir, Aberbargoed, Pengam, Tir-y-berth and Penpedairheol.

The Nant Bargod Rhymni forms the northern boundary of the community and joins the River Rhymney at the north eastern boundary. The Bargoed area generally drains to the River Rhymney which forms the eastern boundary. The Union Brook forms the south-western boundary of the community and also joins the River Rhymney to the south. The southern part of Bargoed drains to the Union Brook. Four other un-named watercourses flowing in an easterly direction towards the River Rhymney are shown on Ordnance Survey mapping. These watercourses appear to be culverted for large sections of their length. The River Rhymney and Nant Bargod Rhymni are designated as main rivers and are therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

Surface water flooding and flooding from ordinary watercourses are the main sources of flooding affecting Bargoed. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties and transport links in the community. Flooding may also occur in more isolated locations, for example due to culvert constrictions. Flooding from main rivers is less extensive and according to the Natural Resources Wales Flood Map is limited to the undeveloped land along the northern boundary of the ward and the railway on the eastern boundary.

Available data:

The following flood risk information is currently available for Bargoed:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads, the railway line and properties across the urban areas of the ward, with the main areas affected in the vicinity of Hill Street, Moorland Road, Wood Street, High Street, Park Drive, Commercial Street and at numerous locations along the railway line. Several areas are shown at high risk with wider areas shown at medium to low risk. Although the surface water map shows a reasonably extensive area affected the statistics suggest only a few properties are at high risk of flooding. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly towards the south of Bargoed. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 10 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Llancayo Street.	This is a severe weather culvert. There is no flooding shown on the surface water map.	3	N
Hillside Park.	This is a severe weather culvert. There is limited flooding but some incidents reported in the vicinity.	1/2	N
Marwyn Gardens.	This is a severe weather culvert. There is some flooding shown on the surface water map.	2	N
Rear of No 2 Hillside Park.	This is a severe weather culvert. There is reasonable flooding shown on the surface water map.	1/2	N
Western Drive.	This is a severe weather culvert. There is reasonable flooding and a blocked culvert reported.	2	N
Hillside Gardens.	This is a severe weather culvert. There is reasonable flooding and a blocked culvert reported.	2	N
Maes-Y-Graig Street.	There is limited flooding shown on the surface water flood map, however incidents have been reported.	2	N
Woodland Place.	There is limited flooding shown on the surface water flood map, however incidents have been reported.	2	N
Lewis Crescent/The Drive.	There is limited flooding shown on the surface water flood map, however several incidents and a blockage have been reported.	2	N

Table 10: Important Culverts - Bargoed

Groundwater – The majority of Bargoed is shown to have low susceptibility to groundwater flooding, based on the underlying geology (or is unclassified). There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. One high risk area was identified in the north east of the community. It is important to note that once properties have been included in the DG5 register this means funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney and Nant Bargod Rhymni for drainage networks and ordinary watercourses in the east of Bargoed where outfalls may be surcharged by high river levels.

Conclusion from maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Bargoed relate to ordinary watercourses, particularly constrictions at culverts, or where the local drainage system is not effective in capturing runoff. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies or culverts. Many of the areas affected are also at risk from flooding by the River Rhymney and Nant Bargod Rhymni. Table 11 summarises the impacts of flooding in Bargoed, based on the surface water flood map. Figure 12 shows the Flood Risk Map for Bargoed.

COUNTS FOR BARGOED COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	8871	533	54	19
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	3775	21	4	4
Services (n)	42	7	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	526	49	11	2
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	3	0.5	0.4	0.4
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	1.1	0	0	0
Listed Buildings (n)	4	0	1	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	60.2	2.6	0.9	3.2

Table 11: Impacts of Flooding in Bargoed - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

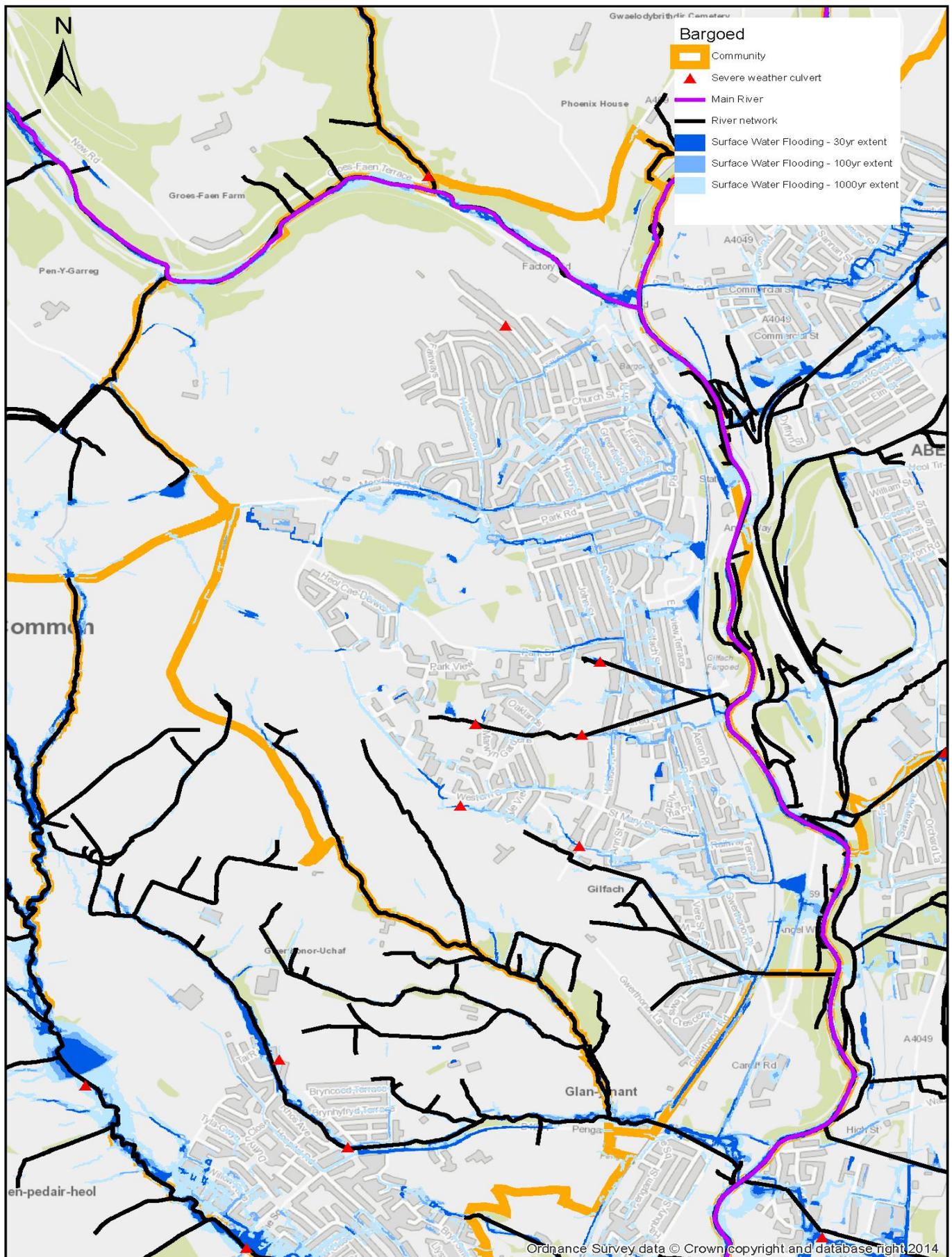


Figure 12: Flood Risk Map for Bargoed

The main flood risks have been identified as follows:***High Street/Heolddu Road/Moorland Road area:***

This area is predominantly at a medium risk of flooding with some areas shown at high risk. This is likely due to flooding from the local drainage network. While the surface water flood map shows a reasonably large area at risk, there are relatively few properties at risk except in larger flood events. Many of the reported flood incidents cite blocked gullies and sewers as a potential cause of the flooding. Flooding along Factory Road and Station Road caused by the River Rhymney (main river) is indicated in this area. Further investigations are proposed.

Park Drive/Angel Lane area:

This area is predominantly at a medium risk of flooding affecting highways and potentially a small number of properties. A number of properties on Sycamore Crescent and office buildings adjacent to Park Place are within a high risk area according to the surface water flood maps. A number of additional properties are within the low risk area. Many of the reported flood incidents in this area cite blocked sewers and gullies as the cause of flooding. Further investigations are proposed.

Commercial Street/Maes – y – Graig Street area:

This area is generally at a medium to low risk of flooding affecting highways and potentially properties. This is likely due to a combination of flooding from the local drainage network and ordinary watercourses. There are extensive areas at low risk according to the surface water flood maps, potentially affecting a number of properties and a school. Further investigations are proposed.

Railway line:

There are numerous areas along the railway line at high risk of flooding from surface water. This is likely due to flooding from the local drainage network and culverted watercourses and may be due to existing culverts not being properly represented in the surface water flood mapping. Flooding at a section of the railway line parallel to Hanbury Road is caused by the River Rhymney (main river). Flooding is also indicated where the railway crosses the Nant Bargod Rhymni to the north of the ward. There is a reported flooding incident at this location caused by a blocked culvert. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Bargoed.

BARGOED - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
BG01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
BG02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 10 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
BG03 CCTV survey of priority culverts identified in task BG02. Capacity check of priority culverts identified in task BG02.	0 – 5 (2015–2021)	£2k (< £100k)	M24	CCBC03 CCBC04
BG04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

BARGOED - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
BG05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
BG06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
BG07	Use the outcomes from task BG02, BG03, BG05 & BG06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£45k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
BG08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
BG09	Assess flood risks to the listed buildings and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£500 (<£100k)	M23	CCBC03

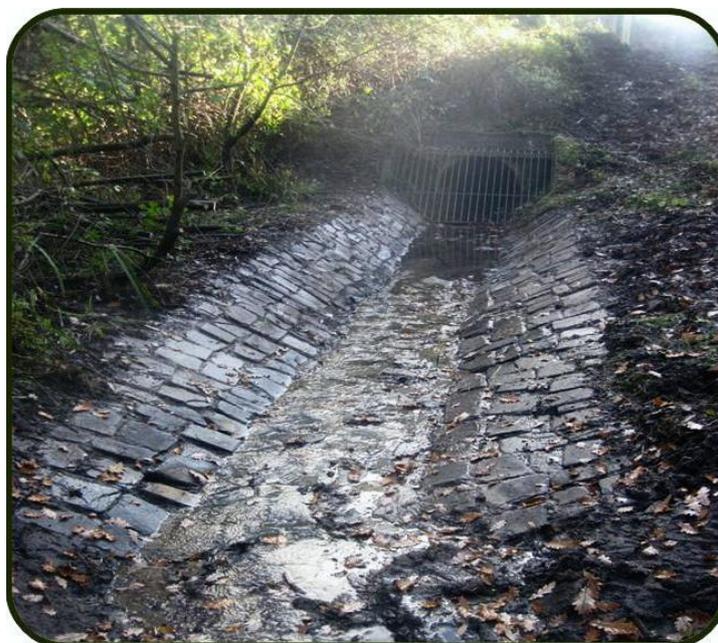
**TOTAL COST OF MEASURES FOR
BARGOED COMMUNITY AREA:**

£61,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**STONE PITCHING DRAINAGE CHANNEL
AT BARGOED**

6.5. Bedwas Community Area

Overview:

The Bedwas community is situated towards the south of the Caerphilly County Borough Council area and includes the urban fringe of Caerphilly town. It covers an area of approximately 6.6 km², which is largely open fields and farmland. Much of the existing development is residential although there is a large industrial estate to the south of the ward adjacent to the River Rhymney. There are also likely to be a number of small businesses and commercial properties particularly towards the town centre and other non-residential properties and services. Neighbouring communities are Ynysddu, Trethomas, Caerphilly East, Caerphilly North, Llanbradach and Maesycwmmmer.

The River Rhymney forms the western and southern boundary of the community, land along the western edge of Bedwas drains in a westerly direction towards the river. The remainder of the Bedwas area generally drains in a southerly direction towards the River Rhymney. The Nant y Bwch flows in a southerly direction through the ward, discharging to the River Rhymney at the industrial estate. Two other un-named watercourses are shown on Ordnance Survey mapping towards the eastern boundary of Bedwas which flow through the urban area before joining the River Rhymney. The River Rhymney is designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

The available data indicates flooding from ordinary watercourses is not particularly extensive, but this has not previously been assessed. Problems may occur in more isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties in the community. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area, with significant risks in some areas.

Available data:

The following flood risk information is currently available for Bedwas:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).
- Drawings relating to a culvert upgrade scheme at Colliery Road (2012).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban areas of the ward, with the main areas affected in the vicinity of Pandy Road, Church Street and Bedwas Road. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly at Colliery Road (where the culvert has been upgraded) and adjacent to the Nant y Bwch at the industrial estate. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 12 shows important culverts that have been identified from the 'Severe Weather Culvert Register' and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Mountain Rd.	This is a severe weather culvert with limited flooding.	3	N
Mountain Rd 2.	This is a severe weather culvert with limited flooding.	3	N
Mountain Road 3, Bedwas below Pen-Y-Waun Farm.	This is a severe weather culvert with limited flooding.	3	N
Colliery Road, Bedwas.	This is a severe weather culvert with limited flooding.	3	N
Colliery Road, Bedwas Side of No 1 Alma Cottages.	This is a severe weather culvert. Some flooding is shown and incidents reported.	2	Y
Top of Rectory Road, Bedwas over stile to inlet.	This is a severe weather culvert. The culvert was upgraded 2012. Some flooding is shown and incidents reported.	3	Y
End of Rectory Road, Bedwas, on disused railway line.	This is a severe weather culvert. Some flooding is shown and incidents reported.	1/2	Y
R/O No 65 Bryn Fedw, Bedwas.	This is a severe weather culvert. Some flooding is shown and incidents reported.	3	Y
R/O The Willows/Bryn Dolwen, Bedwas.	This is a severe weather culvert. Some flooding is shown and incidents reported.	2	Y
Bryn Golau – Bedwas.	This is a severe weather culvert. Incidents reported. Limited flooding.	2	Y
Pandymawr Road, Bedwas.	This is a severe weather culvert. Limited flooding. Some incidents reported.	3	Y
Pandymawr Road 2, Bedwas.	This is a severe weather culvert. Limited flooding. Some incidents reported.	3	Y
Pandy Road.	Blockage reported. Limited flooding.	3	N
Pandy Road 2.	Incidents reported. Some flooding is shown.	3	N
Dol y Pandy.	Blockage incidents reported. Reasonable flooding is shown in the vicinity.	2	Y
Dol y Pandy 2.	Reported incidents in the vicinity.	3	Y

Table12: Important Culverts - Bedwas

Groundwater – The southern part of Bedwas, closer to the River Rhymney, is shown to be susceptible to groundwater flooding, based on the underlying geology. There are also several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. No high risk areas were identified in Bedwas. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Bedwas relate to surface water flooding where the local drainage system is not effective in capturing runoff or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Parts of the industrial estate and local highways are also shown at risk from the River Rhymney (main river) in larger flood events although defences are present to reduce this risk. Table 13 summarises the impacts of flooding in Bedwas, based on the surface water flood map. Figure 13 shows the Flood Risk Map.

COUNTS FOR BEDWAS COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	4054	273	92	24
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	1725	63	9	1
Services (n)	32	1	2	0
Risk to Economic Activity				
Non-Residential Properties (n)	469	41	12	2
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	118.9	8.9	1.6	3.2
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	3	1	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.1	0	0	0
Listed Buildings (n)	12	1	1	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	132.1	3.7	1.5	2.9

Table 13: Impacts of Flooding in Bedwas - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

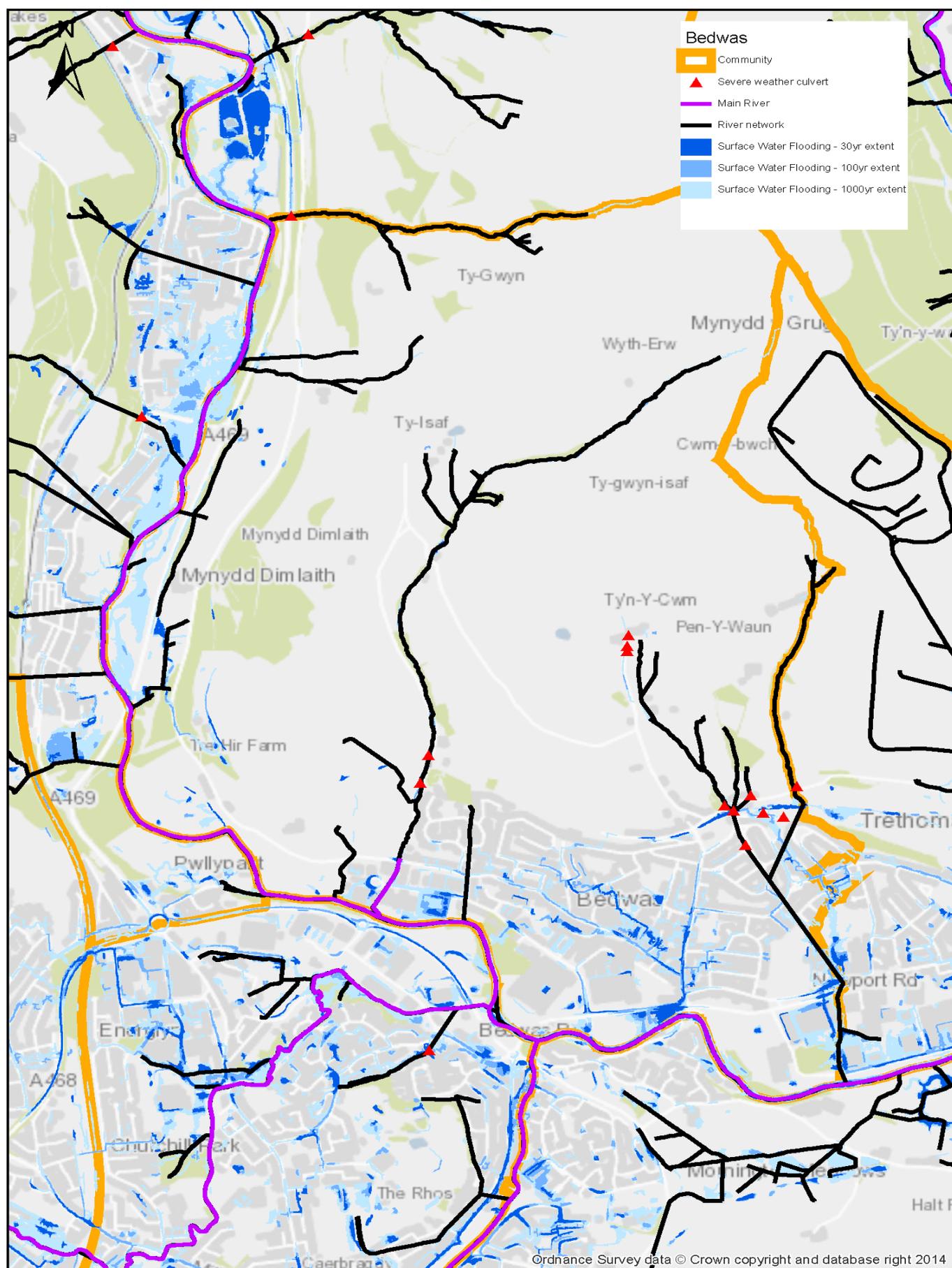


Figure 13: Flood Risk Map for Bedwas

The main flood risks have been identified as follows:***Western End of Industrial Estate:***

This area is at predominantly low risk of flooding although some areas shown are at high risk. This is likely due to a blockage or the capacity of the ordinary watercourse culvert and the local drainage system. This area is also shown at risk of flooding from the River Rhymney. Properties are not shown to be at risk except in larger flood events. Further investigations are proposed.

Cherry Tree Close/Pandy Road/Greenacre Drive area:

This area is generally at a medium to low risk of flooding affecting highways and potentially properties. This is likely due to flooding from the local drainage network. Whilst the surface water flood map shows a reasonably extensive area at risk, there are relatively few properties shown at risk except in larger flood events. However, reported incidents suggest some properties may be at risk and frequently cite blocked manholes and gullies contributing to the flooding. Further investigations are proposed.

Pandy Road/Church Street area:

This area is generally at a medium to high risk of flooding affecting highways and properties. The surface water flood map indicates some residential properties may be at risk of flooding and access is likely to be restricted to properties during a flood event. There are several reported flood incidents in the area. This is more than likely due to a combination of a blockage and/or the capacity of the drainage network which is exacerbated when river levels are high. Further investigations are proposed.

Brynfedw area:

This is a low risk area of flooding that potentially affects properties and access. This is likely due to a combination of a blockage and/or the capacity of the local drainage network and culverted watercourses. There are several reported flood incidents in the area. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Bedwas.

BEDWAS - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
BW01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
BW02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 12 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
BW03 CCTV survey of priority culverts identified in task BW02. Capacity check of priority culverts identified in task BW02.	0 – 5 (2015–2021)	£2k (< £100k)	M24	CCBC03 CCBC04
BW04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

BEDWAS - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
BW05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
BW06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
BW07	Use the outcomes from task BW02, BW03, BW05 & BW06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
BW08	Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on Nant y Bwch at Pandy Road.	0 – 2 (2015–2021)	£5k (< £100k)	M41 / M42	CCBC25
BW09	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
BW10	Assess flood risks to the listed buildings and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£2k (<£100k)	M23 / M51	CCBC03
BW11	Subject to funding, and confirmation from the feasibility study (task BW07), progress a scheme to reduce flood risks from the Bedwas main culvert.	0 – 5 (2015–2021)	£200k (£100k-£500k)	M33	CCBC27 CCBC28

**TOTAL COST OF MEASURES FOR
BEDWAS COMMUNITY AREA:**

£262,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



INTAKE STRUCTURE AT BEDWAS

6.6. Blackwood Community Area

Overview:

The Blackwood community is situated towards the centre of the Caerphilly County Borough Council area and includes the town of Blackwood. It covers an area of approximately 2.7km², which is largely developed with open fields, farmland and woodland situated in the north. Much of the existing development is residential and there are also a number of small business and commercial properties and other non-residential properties and services. Neighbouring communities are Argoed, Penmaen, Pontllanfraith, Pengam, and Cefn Fforest.

The River Sirhowy forms the eastern boundary of Blackwood and the majority of the community drains in an easterly or south-easterly direction towards the River Sirhowy. There are a number of ordinary watercourses flowing towards the River Sirhowy. Many of these watercourses are culverted through the urban areas. The River Sirhowy is a designated main river and is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Sirhowy.

Sources of flooding:

Surface water flooding (where drainage systems cannot cope with high intensity rainfall) and flooding from ordinary watercourses are the main sources of flooding in Blackwood. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area. Flooding from the River Sirhowy (main river) is less extensive and affects land along the eastern fringe of Blackwood.

Available data:

The following flood risk information is currently available for Blackwood:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban area of Blackwood, with the main areas affected in the vicinity of High Street, Wesley Road, Highfields Way and Lon-Pennant. The majority of areas are shown at high to medium risk with more extensive areas at low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly near Wesley Road and Lon-pennant. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 14 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Heol Pit – y-Ceiliogod.	High risk surface water flooding on road. Flood incidents refer to spring.	2	Y
Lon Pennant.	Incidents reported. Reasonable surface water flooding to road.	2	Y
High Street.	Reasonable flow path. Not sure if watercourse is present. Surface water flooding is shown to High Street. Incidents reported.	2/3	Y
Coed Duon (nr Albany Road).	Incidents reported nearby. Surface water flood map suggests flow path from culvert.	1/2	Y
Burnet Drive.	Incidents reported - culvert blockage. Note watercourse not shown on map.	2/3	Y
High Street area.	Incidents reported - blocked drains. High risk shown on surface water flood map.	N/A	N/A
Rear of Libanus School, Libanus Road, Blackwood.	This is a severe weather culvert. Incidents refer to a blocked culvert. Reasonable surface water flooding is shown to road.	3	Y
Blackwood Road.	This is a severe weather culvert. Incidents refer to a blocked culvert. Reasonable surface water flooding is shown to road.	3	Y
Wesley Road, Blackwood.	This is a severe weather culvert. Incidents reported, blocked drains. Significant flow path to High Street area.	1	Y

Table 14: Important Culverts - Blackwood

Groundwater – The majority of Blackwood is shown to have low susceptibility to groundwater flooding, based on the underlying geology (or is unclassified). There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A high, medium and a number of low risk areas were identified in Blackwood. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Sirhowy for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. Land immediately adjacent to the River Sirhowy is shown at risk of main river flooding with a number of properties potentially at risk.

Conclusion from maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Blackwood relate to surface water flooding, where the local drainage system is not effective in capturing runoff or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The eastern part of Blackwood is shown at risk from the River Sirhowy (main river) in larger flood events. Table 15 summarises the impacts of flooding in Blackwood based on the Surface Water flood map. Figure 14 shows the Flood Risk Map.

COUNTS FOR BLACKWOOD COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	6359	331	56	7
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	2706	33	1	0
Services (n)	26	2	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	518	86	40	7
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0.9	0	0	0
Parks and Gardens (ha)	21.6	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	13	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	20.7	3.5	0.7	1.8

Table 15: Impacts of Flooding in Blackwood – Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding

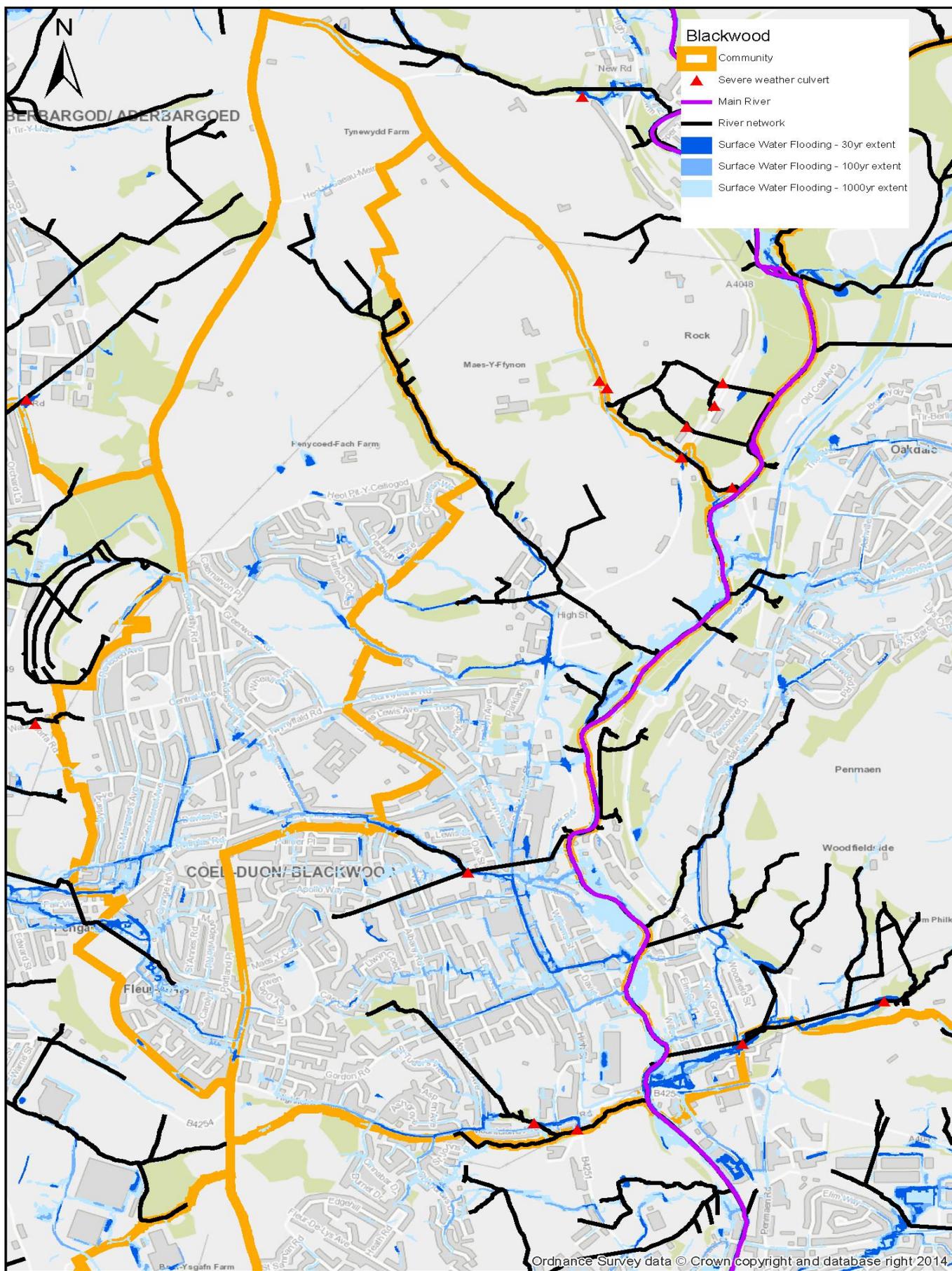


Figure 14: Flood Risk Map for Blackwood

The main flood risks have been identified as follows:***Lon Pennant/High Street area:***

This area is at a predominantly low to medium risk of flooding although some reasonable areas are shown at high risk. This is likely due to a blockage or the capacity of the ordinary watercourse culverts and the local drainage system. The flooding largely affects highways although may affect some properties during larger flood events. Further investigations are proposed.

Wesley Road/High Street area:

This area is at a predominantly low to medium risk of flooding although some roads in the area are shown at high risk. This is likely due to a blockage or the capacity of the ordinary watercourse culvert and local drainage system. This area is also shown at risk from the River Sirhowy, although relatively few properties are shown at risk. Further investigations are proposed.

Highfields Way area:

This area is at a predominantly low risk of flooding although properties may be affected during larger flood events. Flooding in this area is likely to be caused by a blockage or the inadequate capacity of the ordinary watercourse culvert and local drainage system. There are a number of reported flood incidents in the area, many of which cite blocked gullies and surface water sewers and culverts as the cause of flooding. Further investigations are proposed.

Measures To Reduce Flood Risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Blackwood.

BLACKWOOD - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
BL01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
BL02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 14 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
BL03 CCTV survey of priority culverts identified in task BL02. Capacity check of priority culverts identified in task BL02.	0 – 5 (2015–2021)	£3k (< £100k)	M24	CCBC03 CCBC04
BL04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

BLACKWOOD - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
BL05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
BL06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
BL07	Use the outcomes from task BL02, BL03, BL05 & BL06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£45k (3 sites) (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
BL08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
BL09	Subject to funding, complete a prefeasibility study to investigate the causes and potential solutions to flooding at Blackwood Infant School (funding bid submitted to Welsh Government).	0 – 5 (2015–2021)	£40k (<£100k)	M24 / M34	CCBC27 CCBC28

**TOTAL COST OF MEASURES FOR
BLACKWOOD COMMUNITY AREA:**

£101,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**SECONDARY TRASH SCREEN AND
CULVERT INTAKE STRUCTURE
AT BLACKWOOD**

6.7. Caerphilly East Community Area

Overview:

The Caerphilly East ward is situated towards the south of the Caerphilly County Borough Council area and includes the eastern urban areas of Caerphilly town and the community of Van. It covers an area of approximately 3 km², around half of which is urban and the remainder largely open fields. The existing development is mainly residential with the exception of Caerphilly Business Park which is situated to the south of the ward near to the railway line. Neighbouring communities are Rudry, Caerphilly South, Caerphilly North, Bedwas and Trethomas.

The River Rhymney flowing west to east forms the northern boundary of the ward with its tributary, the Porset Brook, forming the western boundary. The catchment to the east of Caerphilly is drained via a network of small drains flowing in a general northerly direction either directly to the River Rhymney or to its tributary the Nant Gwaunybara. The catchment to the south of the railway (within the Caerphilly South ward) is drained via an ordinary watercourse through the Caerphilly Business Park eventually joining with the Porset Brook near to Castle Park. It is assumed the residential areas are drained via the local sewer network or culverted watercourses, discharging to the Porset Brook and River Rhymney. The River Rhymney and Porset Brook, including its tributary upstream to the A468, are designated main rivers and therefore the responsibility of Natural Resources Wales.

Sources of flooding:

Flooding from main rivers, the River Rhymney and Porset Brook, is one of the main sources of flooding affecting the Caerphilly East ward. According to the Natural Resources Wales Flood Map, this affects undeveloped land to the north east of the community and residential areas adjacent to the rivers. Flood defences are present on the River Rhymney reducing flood risk to properties in the Bedwas Road area. The available data indicates flooding from ordinary watercourses is less extensive but problems may occur in more isolated locations, for example due to culvert constrictions. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties in the community.

Available data:

The following flood risk information is currently available for Caerphilly East:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties at Caerphilly Business Park and adjacent to the Porset Brook. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies but incidents suggest the capacity of the drainage may be insufficient to cope with rarer storms. This may be exacerbated when water levels in the River Rhymney and Porset Brook are higher.

Ordinary Watercourses – Flooding from ordinary watercourses generally affects undeveloped land. Some small areas in the vicinity of the ordinary watercourses are shown at risk of flooding potentially affecting properties, particularly at Caerphilly Business Park. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 16 shows important culverts that have been identified from the 'At Risk Culvert Register' and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
A468, rear of Gwaun-hyfyd	Incidents reported. The surface water flood map shows reasonable extent of flooding in the vicinity.	3	N
Van Road, Caerphilly Business Park.	The surface water flood map shows a reasonable extent of flooding in the vicinity.	2	Y

Table 16: Important Culverts – Caerphilly East

Groundwater – A large part of Caerphilly East is shown to be susceptible to groundwater flooding based on the underlying geology, particularly the areas closer to the Porset Brook and River Rhymney. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Parts of Caerphilly were identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment based on the DG5 incidents register, however this does not include the Caerphilly East ward.

Interaction with main river – There is likely to be some interaction with the River Rhymney and Porset Brook for drainage networks where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Caerphilly East relate to surface water flooding, where the local drainage system is not effective in capturing runoff. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Many of the areas affected are also at risk from flooding from the River Rhymney or Porset Brook. Table 17 summarises the impacts of local flooding in Caerphilly East, based on the surface water flood map. Figure 15 shows the Flood Risk Map.

COUNTS FOR CAERPHILLY EAST COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	5205	449	125	28
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	2215	152	16	10
Services (n)	22	2	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	174	25	4	1
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0.3	0	0.1	0
Agricultural Land – Grades 1, 2 and 3 (ha)	131.9	9.5	2.1	3.7
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	13.1	0	0	0
Scheduled Ancient Monuments (ha)	0.3	0	0	0
Listed Buildings (n)	4	0	0	1
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	38.5	4.2	1.4	3.1

Table 17: Impacts of Flooding in Caerphilly East - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

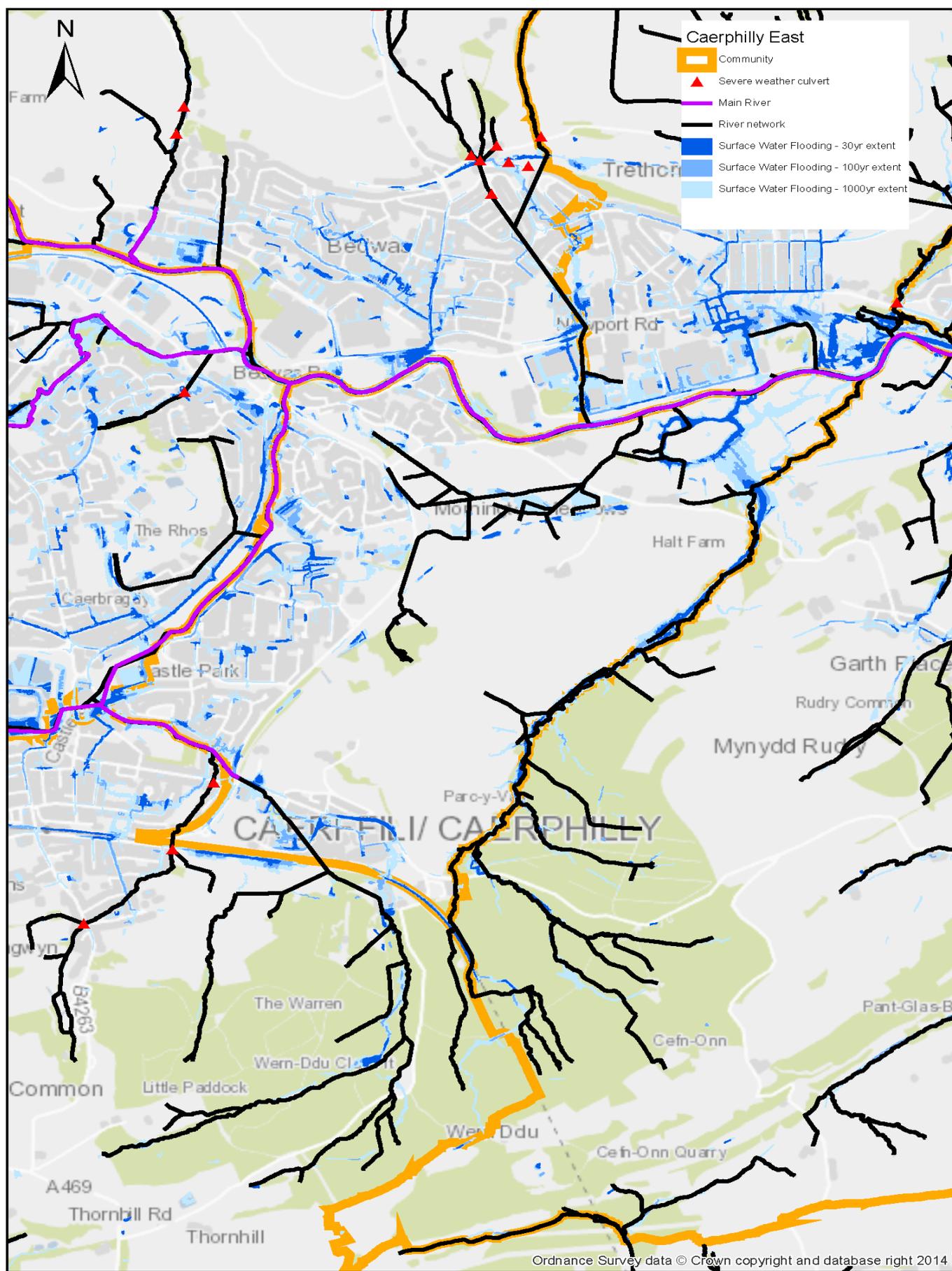


Figure 15: Flood Risk Map for Caerphilly East

The main flood risks have been identified as follows:***Caerphilly Business Park:***

This area is at a medium to high risk of flooding potentially affecting non-residential properties and access. This is most likely to occur from overland flows from the Nant y Pwyntel to the south, blockage or under-capacity of the Van Road culvert, or the capacity of the drainage network. Further investigations are proposed.

A468/Van Road roundabout:

This area is at a medium to high risk of flooding affecting the highway. This is likely due to flooding directly from the Porset Brook tributary or due to a blockage or limited capacity of the highway drainage. Further investigations are proposed.

Area between A468 and Porset Brook:

This area is at a medium to high risk of flooding affecting local access roads and properties. Although reasonably large areas are shown at risk, the number of properties likely to be affected is relatively small except in extreme events. This is likely due to blockages in the drainage system or limited capacity, particularly when river levels are high. A comprehensive assessment of the drainage system is required to better quantify the risks. Further investigations are proposed. Part of this area is also at risk of flooding from the Porset Brook.

Other areas shown to be at risk from the River Rhymney (not specifically addressed in this strategy) include the Bedwas Road area.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Caerphilly East.

CAERPHILLY EAST - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
CE01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
CE02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 16 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
CE03 CCTV survey of priority culverts identified in task CE02. Capacity check of priority culverts identified in task CE02.	0 – 5 (2015–2021)	£1k (< £100k)	M24	CCBC03 CCBC04
CE04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

CAERPHILLY EAST - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CE05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
CE06	Undertake a local community consultation exercise to improve understanding of flooding issues, causes and impacts and inform response plans	0 – 2 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
CE07	Use the outcomes from tasks CE02, CE03, CE05 and CE06 to assess the requirement for and scope of a feasibility study to reduce flooding from the Porset Brook tributary in the vicinity of Caerphilly Business Park and the A468. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
CE08	Subject to funding, use the outcomes from task CE02, CE03, CE05 and CE06 to assess the requirement for and determine if a trash screen/culvert inlet monitor should be installed on the Porset Brook tributary to inform maintenance activities and improve event response.	0 – 2 (2015–2021)	£5k (< £100k)	M41 / M42	CCBC25

CAERPHILLY EAST - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CE09	Subject to funding, use the outcomes from tasks CE02, CE03, CE05 and CE06 to assess the need for a comprehensive drainage assessment focussing on residential areas between A468 & Porset Brook. This would involve detailed survey and studies to assess flood mechanisms and quantify risks and identify potential solutions, assessment of benefits and potential funding sources. If undertaken this would likely be in conjunction with similar studies for neighbouring communities in Caerphilly.	0 – 5 (2015–2021)	£45k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
CE10	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (flood depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
CAERPHILLY EAST COMMUNITY AREA:
£84,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**LINED CONCRETE DITCH LEADING TO
CULVERT AT CAERPHILLY EAST**

6.8. Caerphilly North Community Area

Overview:

The Caerphilly North ward is situated towards the south of the Caerphilly County Borough Council area and includes the central urban area of Caerphilly town. It covers an area of approximately 2.7 km², around two-thirds of which is developed with the remainder designated to open space, parks and recreation. Caerphilly Castle is located towards the south of the ward. The existing development is mainly residential although there are likely to be a number of small businesses and commercial properties, particularly towards the town centre. Neighbouring communities are Bedwas, Caerphilly East, Caerphilly South, Caerphilly West and Llanbradach.

The Caerphilly North area generally drains in a north-easterly direction towards the River Rhymney. The two main watercourses are the Nant yr Aber, which has a reasonably large catchment, draining areas north west of Caerphilly, and the Porset Brook which generally forms the eastern ward boundary and drains land to the south of Caerphilly. These rivers both discharge to the River Rhymney in the vicinity of the A468/B4600 roundabout. All three are designated main rivers where they pass through the Caerphilly North ward, and are therefore the responsibility of Natural Resources Wales. There are a few ordinary watercourses shown on Ordnance Survey mapping which drain to these rivers, however it is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the Nant yr Aber and Porset Brook.

Sources of flooding:

The available data indicates flooding from ordinary watercourses is not particularly extensive but problems may occur in more isolated locations, for example due to culvert constrictions. Ordinary watercourse flooding may be more significant in the vicinity of Pontygwindy Industrial Estate and north of Virginia Park. As many of the ordinary watercourses are culverted where they pass through developed areas, it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties in the community.

Available data:

The following flood risk information is currently available for Caerphilly North:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Crescent Road Bridge Flood Consequence Assessment and hydraulic model of the Nant Gledyr (Porset Brook);
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the ward, with the main areas affected in the vicinity of Mill Road/Lawrence Street, north of Virginia Park, Pontygwindy Industrial Estate, around Lewis Drive and in the vicinity of Heol Trecastell. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages.

Many of the reported flood incidents relate to blocked gullies or drains and not all areas identified as at risk on the surface water flood map have reported incidents.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, potentially affecting properties, particularly at the Pontygwindy Industrial Estate and north of Virginia Park. The Natural Resources Wales Flood Map also indicates this area is at risk of flooding from the Nant yr Aber during large flood events. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related.

Table 18 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Near Churchill Park.	Significant flooding is shown on the surface water flood map, however limited incidents reported.	3 (short culvert)	Y
Rear Pontygwindy Road.	Significant flooding is shown on the surface water flood map, however limited incidents reported.	2/3	Y
Rear Pontygwindy Road 2.	This is a severe weather culvert. Significant flooding is shown on the surface water flood map, however limited incidents reported.	3 (short culvert)	Y
Crescent Road, Caerphilly.	This is a severe weather culvert. Flooding shown to Crescent Road. Culvert replacement recently completed hence blockage risk reduced.	3 (short culvert)	N
Near Golf Course.	Significant flooding is shown to the B4600. Some reported incidents in the vicinity.	2	N
Virginia Park.	Significant flooding is shown to the B4600. Some reported incidents in the vicinity.	2	N
Hazel Grove.	Significant flooding is shown to the B4600. Some reported incidents in the vicinity.	2	N
Near Heol Ty Merchant.	This is a severe weather culvert. Significant flooding is shown, blockage incidents reported.	1/2	Y

Table 18: Important Culverts – Caerphilly North

Groundwater – The majority of Caerphilly North is shown to be susceptible to groundwater flooding based on the underlying geology. There are isolated reports of flooding incidents due to seepage through retaining walls however no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Parts of Caerphilly were identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment based on the DG5 incidents register, which includes the Caerphilly North ward. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the Nant yr Aber and Porset Brook for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. Defences are present along the Nant yr Aber, however no area benefitting from defences has been identified suggesting the standard of protection is less than 100 years.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Caerphilly North relates to surface water flooding, where the local drainage system is not effective in capturing runoff. This is due to ingress of excess surface water or ordinary watercourses where culverts may have restricted capacity. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 19 summarises the impacts of flooding in Caerphilly North, based on the surface water flood map. Figure 16 shows the Flood Risk Map.

COUNTS FOR CAERPHILLY NORTH COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	7024	409	40	14
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	2989	47	9	2
Services (n)	39	1	2	2
Risk to Economic Activity				
Non-Residential Properties (n)	512	62	17	5
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	1.1	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	77.4	9.2	3.2	2.8
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	1	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	12.6	2.2	1.0	1.3
Listed Buildings (n)	3	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	11.4	3.0	1.2	2.1

Table 19: Impacts of Flooding in Caerphilly North - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

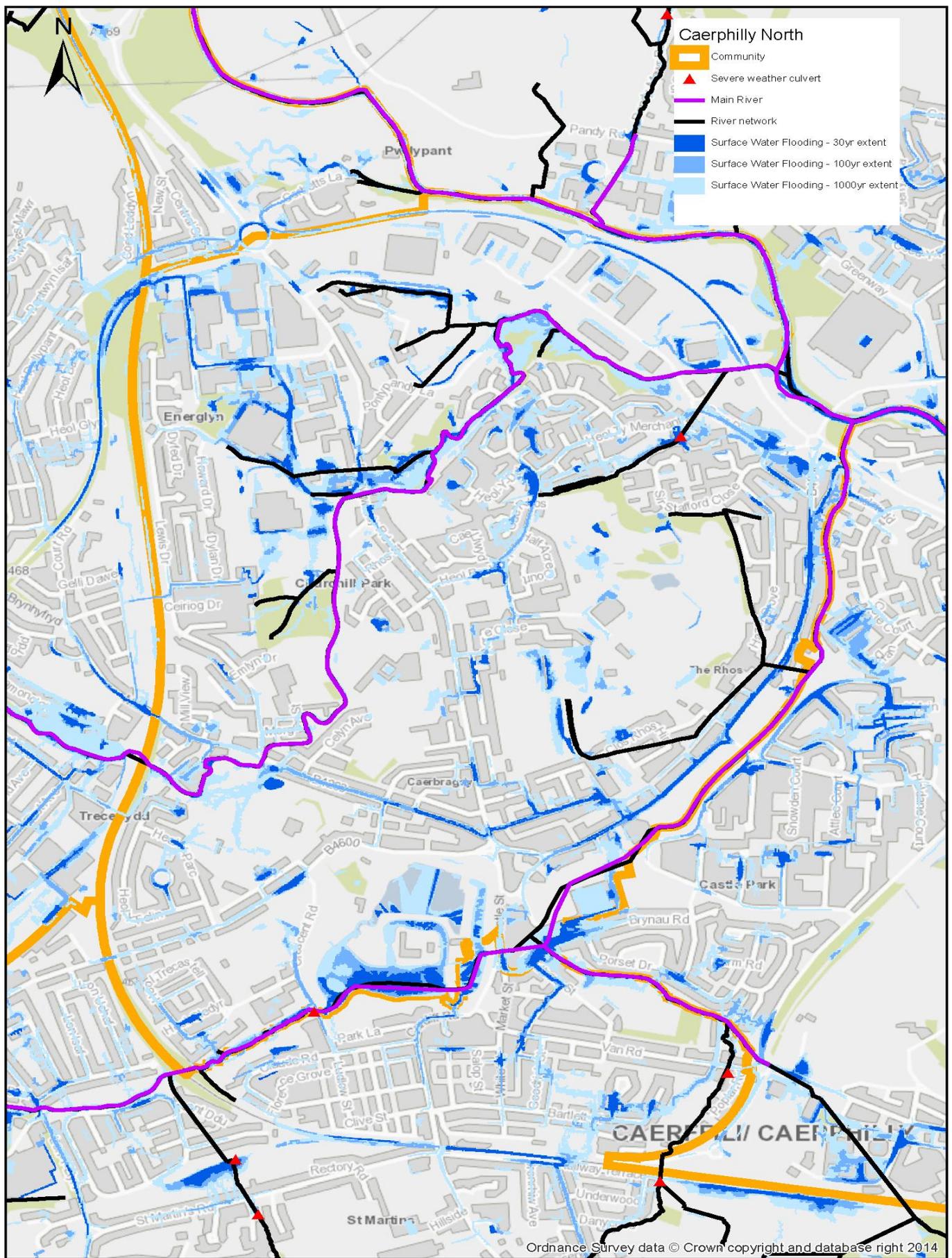


Figure 16: Flood Risk Map for Caerphilly North

The main flood risks have been identified as follows:***Mill Road/Lawrence Street area:***

This area is at a medium to high risk of flooding mainly affecting the local highway although some incident reports suggest properties could be at risk. This is most likely to occur from a blockage or under capacity of the local drainage network. It is noted that whilst the surface water flood map shows a reasonably extensive area at risk, there are only a relatively few properties shown at risk of flooding except for during large flood events. This area is also shown to be at risk from the Nant y Aber in larger flood events. Further investigations are proposed.

North of Virginia Park:

This area is at a medium to high risk of flooding potentially affecting residential properties and local highways, particularly around Heol Bro Wen and Parc Pontypandy. This is likely due to flooding from the ordinary watercourse or the local drainage network, although the area is also shown at risk of flooding from the Nant y Aber during larger flood events. It is noted that whilst the surface water flood map shows a reasonably extensive area at risk, there are relatively few properties shown at risk. Further investigations are proposed.

Pontywindy Industrial Estate:

This area is at a medium to high risk of flooding potentially affecting local highways and commercial properties. This is likely due to the local drainage network and the ordinary watercourse in the immediate vicinity being exacerbated by blockage of gullies and culverts. Previous incident reports suggest that blocked gullies and drains have been the main issue in the past. Further investigations are proposed.

Lewis Drive area:

This area is at a medium to low risk of flooding potentially affecting local highway and residential properties. This is most likely due to a blockage or the capacity of the drainage network. Incident reports suggest blockage of drains and sewers is a significant contributor to the problem. The surface water flood map indicates properties are not at risk except in extreme flood events however, there are some reports of property flooding occurring in the past. Further investigations are proposed.

Heol Trecastell area:

This area is at a medium to high risk of flooding potentially affecting local highways and residential properties. This is most likely due to a blockage or the capacity of the drainage network. The surface water flood map indicates properties are only at risk during extreme flood events and there are few incidents reported, therefore this is not considered a significant issue. Continued monitoring of reported incidents is proposed to better quantify the risk.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Caerphilly North.

CAERPHILLY NORTH - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
CN01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
CN02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 18 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
CN03 CCTV survey of priority culverts identified in task CN02. Capacity check of priority culverts identified in task CN02.	0 – 5 (2015–2021)	£2k (< £100k)	M24	CCBC03 CCBC04
CN04 Consultation with Natural Resources Wales to consider flooding impacts to the Nant y Aber Sites of Interest for Nature Conservation and determine if mitigation is required. (NB Nant y Aber is main river therefore this would be the responsibility of Natural Resources Wales).	0 – 2 (2015–2021)	£500 (< £100k)	N/A	N/A

CAERPHILLY NORTH - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CN05	Request records for the Caerphilly Castle moat from CADW to understand the structures and operation.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
CN06	Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
CN07	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
CN08	Complete a consultation exercise with businesses and residents, focussing on the areas identified above to improve information on previous flooding, its impacts and causes. Particularly for the Pontyglyndy Industrial Estate where the consultation will also establish the feasibility of collaboration, either through flood action groups and/or local contributions.	0 – 2 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
CN09	Use the outcomes from task CN02, CN03, CN07 and CN08 to assess the requirement for and scope of feasibility studies to reduce flooding from local drainage systems and ordinary watercourses. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks (from ordinary watercourses and drainage networks); feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources. This could potentially be undertaken as part of a Caerphilly wide study if it is cost effective to do so.	0 – 5 (2015–2021)	£65k (< £100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28

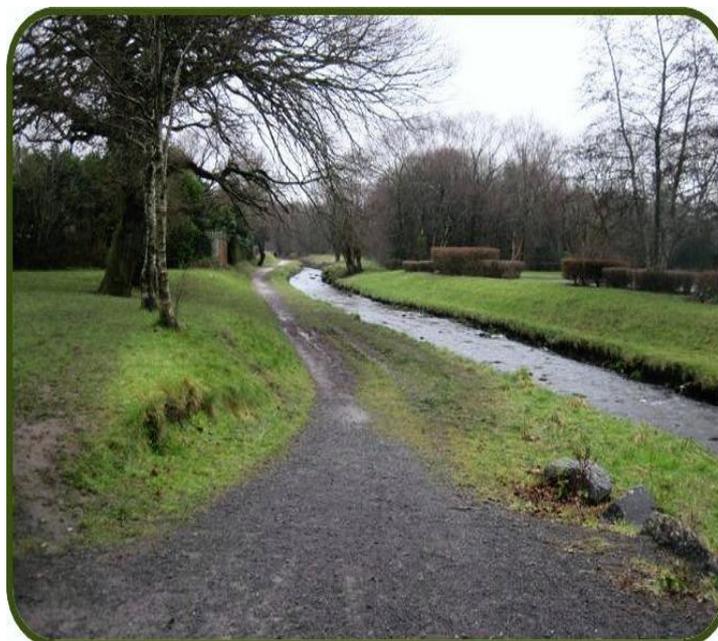
CAERPHILLY NORTH - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
CN10 Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on ordinary watercourse to north of Victoria Park.	0 – 2 (2015–2021)	£15k (3 sites) (< £100k)	M41 / M42	CCBC25
CN11 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
CAERPHILLY NORTH COMMUNITY AREA:
£96,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



WATERCOURSE IN CAERPHILLY NORTH

6.9. Caerphilly South Community Area

Overview:

The Caerphilly South community is situated towards the south of the Caerphilly County Borough Council area and includes the southern urban areas of Caerphilly town. It covers an area of approximately 7 km², around one third of which is urban and the remainder largely open fields and wooded valleys. The existing development is mainly residential with the exception of the Western Industrial Estate although other services including offices, schools, a hospital and police station are also present. Neighbouring communities are Rudry, Caerphilly East, Caerphilly North, and Caerphilly West. Caerphilly South also borders the neighbouring local authorities of Cardiff City Council and Rhondda Cynon Taf County Borough Council.

The catchment south of Caerphilly generally drains in a northerly direction via the ordinary watercourses of Nant Felen, Nant Ddu and Nant y Calch. These join with the Nant Gledyr and Porset Brook which flow through the north of the ward and eventually join the River Rhymney. The wooded areas to the east of the ward drains via the Scouring Brook and Nant y Pwyntel which form a tributary of the Porset Brook flowing through the neighbouring Caerphilly East ward. The southern part of the Caerphilly South ward drains south and southwest into neighbouring local authority areas. It is assumed the developed areas are drained via the local sewer network or culverted watercourses, discharging to the Nant Gledyr and Porset Brook. The Nant Gledyr and Porset Brook are designated main rivers, and therefore the responsibility of Natural Resources Wales.

Sources of flooding:

The available data indicates flooding from ordinary watercourses is not particularly extensive however problems may occur in more isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties in the community. Flooding from the Nant Gledyr (main river) potentially affects land and property in the vicinity of the watercourse.

Available data:

The following flood risk information is currently available for Caerphilly East:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties in the vicinity of Ffordd Traws Cwm, Western Industrial Estate, Lon-y-Llyn, Princes Avenue and Bartlett Street. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains and not all areas identified as at risk on the surface water flood map have reported incidents. A pond is present south of the Western Industrial Estate which is likely to help manage surface runoff and flows in the Nant Felen although the details of its operation are unknown.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, potentially affecting properties, particularly at the Western Industrial Estate and in the vicinity of Ffordd Traws Cwm. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. As the watercourses are generally culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 20 shows important culverts that have been identified from the 'Severe Weather Culvert Register' and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Opposite Ffordd Traws Cwm.	Incidents recorded. The surface water flood map shows that a blockage could affect Watford Road.	3	Y
Clos Enfys, Watford Park, rear of no 17.	This is a severe weather culvert. The surface water flood map shows a high risk area downstream affecting properties. Blocked culvert reported.	1	Y
Pond outlet south of Western Industrial Estate.	This is a severe weather culvert. Surface water pond outlet.	2	N
Western Industrial Estate.	Reasonable surface water flooding is shown on the flood map. Incidents reported in area.	1	N
Railway near St Clears Close.	This is a severe weather culvert. Surface water flood map shows the backing up behind railway, some incidents reported in the vicinity.	2	Y
Glan Nant Close, Caerphilly.	This is a severe weather culvert. Limited flooding is shown but some incidents reported in the vicinity.	2	Y
A469 at Thornhill.	This is a severe weather culvert. Limited flooding is shown on the surface water flood map.	3	N
Mountain Road, Caerphilly.	This is a severe weather culvert. Limited flooding is shown. Some incidents recorded in the vicinity.	3	Y
Princes Avenue.	The surface water flood map shows reasonable flooding and incidents reported in the vicinity. Flooding could potentially affect the railway.	3	Y

Location	Comment	CCTV required (priority)	Capacity check required
Rear of No11, Underwood, Caerphilly.	This is a severe weather culvert. Some flooding is shown in the vicinity.	3	Y
Van Road, Caerphilly.	This is a severe weather culvert. Reasonable surface water flooding is shown on the flood map and incidents reported in the vicinity.	3	Y
Van Road near railway.	The surface water flood map shows reasonably extensive backing up behind culvert.	3	Y
Watford Road to Blackbrook Road.	This is a severe weather culvert. Limited flooding is shown, no incidents reported.	3	N

Table 20: Important Culverts – Caerphilly South

Groundwater – Large areas of Caerphilly South are shown to be susceptible to groundwater flooding based on the underlying geology, particularly the urban area to the north. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. The majority of these are located in the rural area south of the town. However no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Parts of Caerphilly were identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register, however this does not include the Caerphilly South community.

Interaction with main river – There is likely to be some interaction with the Nant Gledyr and Porset Brook for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusion from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Caerphilly South relate to surface water flooding, where the local drainage system is not effective in capturing runoff or ordinary watercourses where culverts may have restricted capacity. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 21 summarises the impacts of local flooding in Caerphilly South, based on the surface water flood map. Figure 17 shows the Flood Risk Map.

COUNTS FOR CAERPHILLY SOUTH COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding >0.0m</u>				
People (n) (multiplier 2.35)	8397	465	92	82
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	3573	97	24	13
Services (n)	49	1	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	755	49	7	3
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	2.2	0.3	0.2	0.3
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	6.5	0.4	0.1	0.2
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	11.3	0.3	0.1	0.2
Listed Buildings (n)	15	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	200.8	2.3	0.4	0.3

Table 21: Impacts of Flooding in Caerphilly South - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding

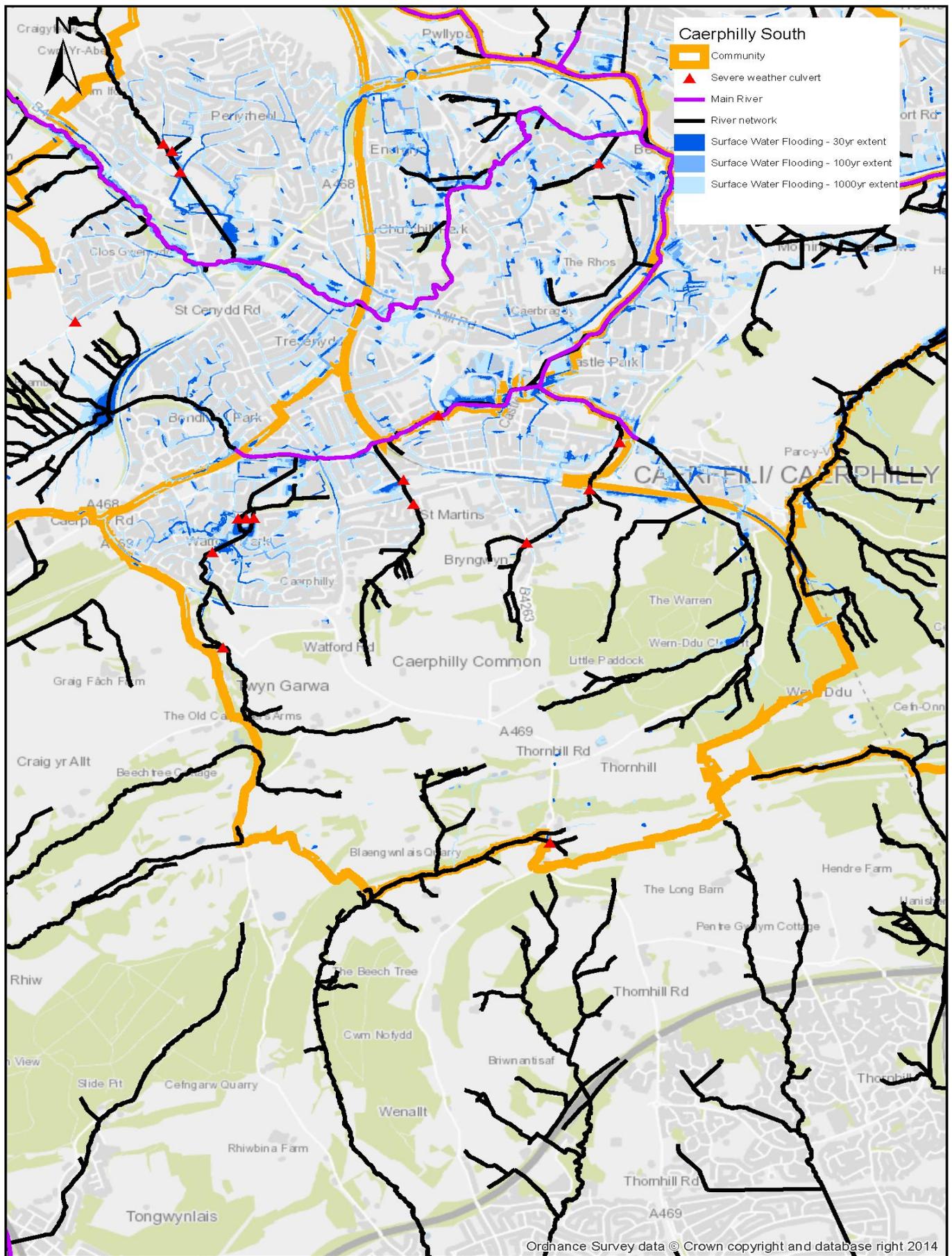


Figure 17: Flood Risk Map for Caerphilly South

The main flood risks have been identified as follows:***Ffordd Traws Cwm and vicinity:***

This area is at a medium to high risk of flooding potentially affecting residential properties and highways. This is most likely to occur from blockage or under-capacity of the Nant Felen culverts or the capacity of the drainage network. It is noted that whilst the surface water flood map shows a reasonably extensive area at risk there are relatively few incidents reported and these do not include properties. Further investigations are proposed.

Western Industrial Estate:

This area is at a medium to high risk of flooding potentially affecting non-residential properties and access roads. This is likely due to flooding from the ordinary watercourse or the local drainage network. It is noted that whilst the surface water flood map shows a reasonably extensive area at risk there are few properties shown at risk. This area is also shown at risk of flooding from the Nant Gledyr. Further investigations are proposed.

Area adjacent to the disused railway line at St Martin's:

This is an area of high risk shown on the surface water flood map where water backs up behind the railway. It is unlikely that the surface water modelling properly accounts for the culvert capacity and the flooding is not shown to affect properties. No incidents have been reported. Therefore this is not considered a significant risk.

Area around Princes Avenue:

An area of medium to low risk of flooding is shown on the surface water flood map, however only a few properties are shown at medium to low risk. There have been a few reported flooding incidents in the area. Flooding is likely to be from the Nant y Calch, overland runoff from the south and the local drainage system, potentially exacerbated by blockage. Further investigations are proposed.

Area around Bartlett Street:

An area of medium to high risk is shown on the surface water flood map, however only a few properties are shown at risk except in large events. There have been reported incidents in the area which largely relate to blocked drains and gullies. Flooding is likely to be from the Nant y Calch or the local drainage network, potentially exacerbated by blockage. Further investigations are proposed.

Area near the Warren:

The surface water flood map shows an area of high risk upstream of the access track where the Nant y Pwyntel enters a culvert. The surface water model is unlikely to properly account for the culvert however, it is indicative of areas at risk in the event of blockage. No incidents have been reported however the surface water flood map indicates that this could affect properties immediately downstream in larger flood events and the Caerphilly Business Park further afield (in the Caerphilly East ward). Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Caerphilly South.

CAERPHILLY SOUTH - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
CS01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
CS02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 20 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
CS03 CCTV survey of priority culverts identified in task CS02. Capacity check of priority culverts identified in task CS02.	0 – 5	£4k (< £100k)	M24	CCBC03 CCBC04
CS04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

CAERPHILLY SOUTH - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CS05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
CS06	Undertake a local community consultation exercise to improve understanding of flooding issues, causes and impacts and inform response plans.	0 – 2 (2015–2021)	£2.5k (<£100k)	M24 / M44 / M53	CCBC10
CS07	Use the outcomes from task CS02, CS03, CS05 and CS06 to assess the requirement for and scope of feasibility studies to reduce flooding from the Nant Felen, Nant y Calch and Nant Pwyntel. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks (from ordinary watercourses and drainage networks); feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£60k (3 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
CS08	Subject to funding, use the outcomes from task CS02, CS03, CS05 and CS06 to assess the requirement for and determine if a trash screen/culvert inlet monitor should be installed on the Nant Felen, Nant y Calch and Nant y Pwyntel tributaries to inform maintenance activities and improve event response.	0 – 2 (2015–2021)	£15k (3 sites) (< £100k)	M41 / M42	CCBC25

CAERPHILLY SOUTH - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CS09	Subject to funding, use the outcomes from tasks CS02, CS03, CS05 and CS06 to assess the need for a comprehensive drainage assessment focussing on residential areas around Bartlett Street. This would involve detailed survey and studies to assess flood mechanisms and quantify risks and identify potential solutions, assessment of benefits and potential funding sources. If undertaken this would likely be in conjunction with similar studies for neighbouring communities in Caerphilly.	0 – 5 (2015–2021)	£45k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
CS10	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
CAERPHILLY SOUTH COMMUNITY AREA:
£137,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**SECONDARY TRASH SCREEN AND
HEAD WALL IN CAERPHILLY SOUTH**

6.10. Caerphilly West Community Area

Overview:

The Caerphilly West community is situated towards the south of the Caerphilly County Borough Council area and includes the western urban area of Caerphilly town. It covers an area of approximately 5.8 km², around half of which is developed with the remainder open fields and farmland. The existing development is mainly residential although there are likely to be a number of small businesses and commercial properties, particularly towards the town centre. Trecenydd Business Park is situated within the ward, close to the eastern boundary. Neighbouring communities are Abertridwr, Llanbradach, Caerphilly North and Caerphilly South. Caerphilly West also borders the neighbouring local authority of Rhondda Cynon Taf County Borough Council.

The Caerphilly West area generally drains in a south-easterly direction towards the two main watercourses flowing through the ward, the Nant yr Aber and Nant Gledyr. The Nant yr Aber has a reasonably large catchment draining areas North West of Caerphilly, and is designated main river (under the jurisdiction of Natural Resources Wales) where it flows through the ward. The Nant Gledyr is an ordinary watercourse as it passes through the Caerphilly West area but becomes main river further downstream. These rivers both eventually discharge to the River Rhymney. There are a few ordinary watercourses shown on Ordnance Survey mapping which drain to these rivers however it is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the Nant yr Aber and Nant Gledyr.

Sources of flooding:

The available data indicates flooding from ordinary watercourses is not particularly extensive however may affect properties and highway in the immediate vicinity of the watercourses. Problems may occur in more isolated locations, for example due to culvert constrictions. Ordinary watercourse flooding may be more significant in the vicinity of Ffordd Penrhos and Penyrheol. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties in the community.

Available data:

The following flood risk information is currently available for Caerphilly West:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Groeswen Lane feasibility appraisal and scheme drawings;
- Coed y Pica scheme drawings;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across Caerphilly West, with the main areas affected in the vicinity of the Nant Gledyr (Ffordd Penrhos), Diamond Close, Ty Nant, Brookside Close, Cwm Ifor Primary School and Aneurin Park. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains and not all areas identified as at risk on the surface water flood map have reported incidents.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, potentially affecting properties, particularly in the vicinity of Ffordd Penrhos, Brookside Close, Diamond Close and Aneurin Park. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 22 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Rear of Cwmifor Primary School, Penyrheol.	This is a severe weather culvert. There has been flooding and recorded incidents in the vicinity.	1/2	Y
Side of Cwmifor Primary School, Penyrheol.	This is a severe weather culvert. There has been flooding and recorded incidents in the vicinity.	3	Y
Front of Cwmifor Primary School, Penyrheol.	This is a severe weather culvert. There has been flooding and recorded incidents in the vicinity.	1	Y
Dismantled railway near Sunningdale.	No incidents recorded but the surface water flood map suggests significant flooding if a blockage occurred.	3	N

Table 22: Important Culverts – Caerphilly West

Groundwater – The majority of Caerphilly West is shown to have low susceptibility to groundwater flooding based on the underlying geology. The underlying geology in the urban areas however is more susceptible, there are also several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Parts of Caerphilly were identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register, which includes the Caerphilly West area. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the Nant yr Aber for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Caerphilly West relate to surface water flooding, where the local drainage system is not effective in capturing runoff. This is due to ingress of excess surface water or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Land and property in the vicinity of the Nant yr Aber may also be at risk of main river flooding, particularly during larger flood events. Table 23 summarises the impacts of flooding in Caerphilly West, based on the surface water flood map. Figure 18 shows the Flood Risk Map.

COUNTS FOR CAERPHILLY WEST COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	11715	588	78	82
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	4985	109	19	22
Services (n)	36	1	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	419	24	5	1
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	1.1	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	2.6	0.2	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	31.3	3.0	0.8	1.3
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.6	0	0	0
Listed Buildings (n)	7	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	85.4	6.3	2.4	4.5

Table 23: Impacts of Flooding in Caerphilly West - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding

The main flood risks have been identified as follows:***Ffordd Penrhos area:***

This area is largely at low risk of flooding, mainly affecting the local highway and potentially properties in larger events. This is most likely to occur from a blockage or the under-capacity of the local drainage network. Flooding directly from the watercourse, particularly if culvert blockage occurs, may affect adjacent areas. It is noted that whilst the surface water flood map shows a reasonably extensive area at risk, properties are not shown at risk of flooding except during large flood events. There are no reported flooding incidents in this area. No further investigations are proposed at present although flood incident reports will continue to be monitored to review this in the future.

Diamond Close area:

This area is generally at low risk of flooding, although there are some high risk areas shown on the surface water map potentially affecting properties. This is likely due to flooding from the local drainage network although this may be exacerbated by high levels in Nant y Aber during larger flood events. It is noted that whilst the surface water flood map shows a reasonably extensive area at risk, there are relatively few properties shown at risk except in larger events and no reported incidents of property flooding. Reported incidents generally refer to carriageway flooding and blocked gullies. Further investigations are proposed.

Brookside Close area:

This area is at low risk of flooding potentially affecting properties adjacent to the Nant yr Aber. This is likely due to flooding from the river, however may also occur due to a blockage or limited capacity of drainage systems, especially when river levels are high. There are few reported incidents of flooding in the area and no reports of property flooding. No further investigations are proposed at present although flood incident reports will continue to be monitored to review this in the future.

Aneurin Park area:

This area is at a medium to high risk of flooding potentially affecting local highway, residential properties and the local primary school. This is likely due to a combination of a blockage or the capacity of the drainage network, combined with flooding from the tributary of the Nant yr Aber which flows through this area. This watercourse is culverted between Heol Aneurin and Orchards Poultry Farm. The surface water flood map indicates several properties are at high risk of flooding and there are several reported flood incidents in the area which suggest properties were at risk. Incident reports suggest blockage of drains, sewers and culverts is a significant contributor to the problem. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Caerphilly West.

CAERPHILLY WEST - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
CW01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
CW02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 22 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
CW03 CCTV survey of priority culverts identified in task CW02. Capacity check of priority culverts identified in task CW02.	0 – 5 (2015–2021)	£1k (< £100k)	M24	CCBC03 CCBC04
CW04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination	0 – 5 (2015–2021)	£2.5 (< £100k)	N/A	CCBC03

CAERPHILLY WEST - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CW05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
CW06	Complete a consultation exercise with local residents, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
CW07	Use the outcomes from task CW02, CW03, CW05 and CW06 to assess the requirement for and scope of feasibility studies to reduce flooding from local drainage systems and ordinary watercourses in the vicinity of Aneurin Park. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks (from ordinary watercourses and drainage networks); feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£25k (< £100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
CW08	Use the outcomes from task CW02, CW03, CW05 and CW06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the vicinity of Diamond Close. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources. This could potentially be undertaken as part of a Caerphilly wide study if it is cost effective to do so.	0 – 5 (2015–2021)	£45k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28

CAERPHILLY WEST - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
CW09 Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on ordinary watercourse near Aneurin Park.	0 – 2 (2015–2021)	£5k (< £100k)	M41 / M42	CCBC25
CW10 Subject to funding, and confirmation from the feasibility study (task CW07), progress a scheme to reduce flood risks from the ordinary watercourse upstream and through Aneurin Park.	0 – 5 (2015–2021)	£140k (£100k-£500k)	M33	CCBC27 CCBC28
CW11 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
CAERPHILLY WEST COMMUNITY AREA:**

£229,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	3 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**BESPOKE DRAINAGE GRID
IN CAERPHILLY WEST**

6.11. Cefn Fforest Community Area

Overview:

The Cefn Fforest community is situated towards the north of the Caerphilly County Borough Council area and includes the town of Cefn Fforest. It covers an area of approximately 2.2km², which is largely urbanised with some open fields in the north. Much of the existing development is residential although there are also likely to be a number of small business, commercial properties and other non-residential properties and services. Neighbouring communities are Bargoed, Aberbargoed, Argoed, Blackwood, Pengam and Tir-y-berth.

The majority of Cefn Fforest drains to the east to the River Sirhowy in the neighbouring Blackwood community. A small part of the community drains west towards the River Rhymney. There is an ordinary watercourse located in the north of Cefn Fforest flowing in a south easterly direction towards the River Sirhowy. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses.

Sources of flooding:

The available information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, is the main source of flooding in Cefn Fforest. Flooding from ordinary watercourses is not particularly extensive however problems may occur in more isolated locations, for example due to culvert restrictions. As many of the watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area.

Available data:

The following flood risk information is currently available for Cefn Fforest:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban area of Cefn Fforest, with the main areas affected in the vicinity of Bryngoleu Street, Bloomfield Road and Heol y Dderwen. The majority of these areas are shown at medium to high risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly in the south of Cefn Fforest. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 24 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Heol Y Dderwen.	The surface water flood map shows reasonable flooding in the vicinity. Some incidents reported with gullies, culverts and the highway.	2	Y

Table 24: Important Culvert – Cefn Fforest

Groundwater – The majority of Cefn Fforest is shown to have low susceptibility to groundwater flooding, based on the underlying geology (or is unclassified). There is an old mine shaft in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Two high risk areas were identified in Cefn Fforest. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There may be some interaction with the River Rhymney and River Sirhowy for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. This is unlikely to have a significant impact on Cefn Fforest given the distance from the boundary to the main rivers.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Cefn Fforest relate to surface water flooding, where the local drainage system is not effective in capturing runoff and flooding from ordinary watercourses. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 25 summarises the impacts of flooding in Cefn Fforest, based on the surface water flood map. Figure 19 shows the Flood Risk Map.

COUNTS FOR CEFN FFOREST COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	6079	289	54	19
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	2587	35	5	0
Services (n)	22	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	170	1	0	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	0	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	8.5	0.4	0.1	0.2

Table 25: Impacts of Flooding in Cefn Fforest – Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

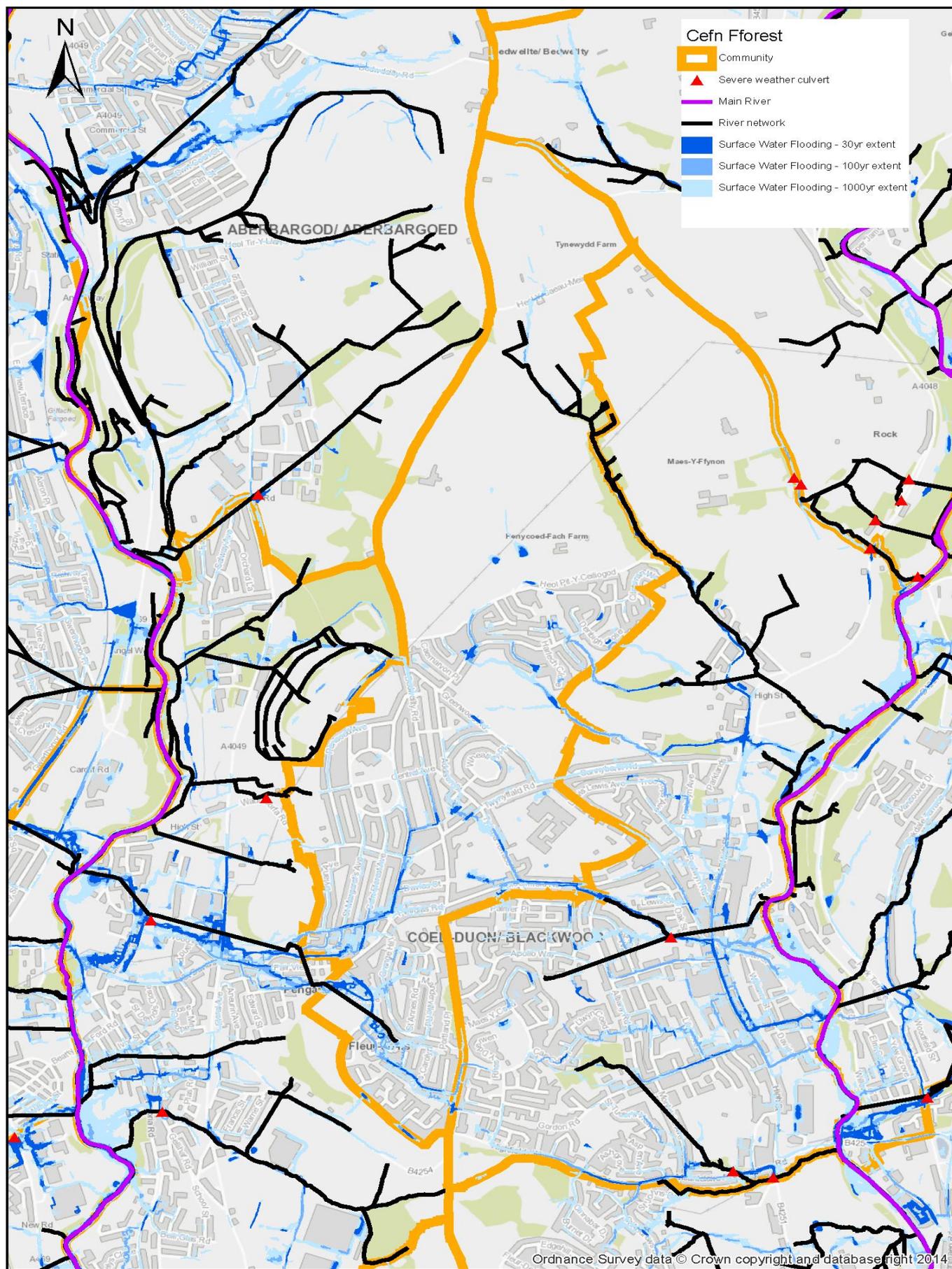


Figure 19: Flood Risk Map for Cefn Fforest

The main flood risks have been identified as follows:***Pwllglas Road/Bryngoleu Street area:***

This area is predominantly at a low to medium risk of flooding with some areas shown at high risk. This is likely due to a blockage or the capacity of the local drainage system. Many of the reported flood incidents in this area indicate blocked gullies and sewers as contributing to the flooding. The surface water flood maps show that a small number of properties in this area are at a medium to low risk of flooding, however few are shown at risk of internal flooding. Further investigations are proposed.

Heol Y Dderwen area:

This area is predominantly at a low to medium risk of flooding with some areas shown at high risk. This is likely due to a blockage or the capacity of the local surface water drainage system and the ordinary watercourse culvert located downstream in Pengam. Some properties in this area shown as at a medium to high risk of flooding, however few are shown as at risk of internal flooding. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Cefn Fforest.

CEFN FFOREST - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
CF01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
CF02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 24 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
CF03 CCTV survey of priority culverts identified in task CF02. Capacity check of priority culverts identified in task CF02.	0 – 5 (2015–2021)	£2k (< £100k)	M24	CCBC03 CCBC04
CF04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

CEFN FFOREST - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CF05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
CF06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
CF07	Use the outcomes from task CF02, CF03, CF05 and CF06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£45k (2 sites) (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
CF08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
CEFN FFOREST COMMUNITY AREA:**

£60,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
5 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**OLD STONE WALL STRCUTURE
IN CEFN FFOREST**

6.12. Crosskeys Community Area

Overview:

Crosskeys is situated towards the east of the Caerphilly County Borough Council area. It covers a largely rural area of approximately 5.7 km² with one settlement of Crosskeys in the Ebbw Valley. The River Ebbw flows north to south through the area with the River Sirhowy joining from the west. The Monmouthshire and Brecon Canal also flows through the area in a general north/south direction. The remainder of the community consists mainly of steep wooded valleys. Neighbouring communities are Abercarn, Ynysddu and Pontymister West.

The catchment to the east of Crosskeys is drained by the Nant Carn, Cwm Byr and un-named tributaries which flow in a westerly or southerly direction to discharge into the River Ebbw. These watercourses cross the Monmouthshire and Brecon Canal although it is unknown at this stage whether there is any hydraulic connection. The catchment to the west of Crosskeys is drained by un-named watercourses discharging to the River Ebbw. The rural catchment to the south of the community drains to the River Sirhowy, which joins with the River Ebbw just to the south of Crosskeys.

Sources of flooding:

The main source of flooding in Crosskeys is the River Ebbw which, according to the Natural Resources Wales Flood Map, affects largely undeveloped and recreational areas adjacent to the river. Residential and industrial properties are shown to be at risk from the Rivers Ebbw and Sirhowy close to their confluence; however flood defences are present in these reaches which reduce the risk. The River Ebbw and River Sirhowy are designated main rivers under the jurisdiction of Natural Resources Wales. The available data indicates flooding from ordinary watercourses is less extensive however problems may occur in more isolated locations, for example due to culvert constrictions. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect some properties in the community.

Available data:

The following flood risk information is currently available for Crosskeys:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding in lower lying areas closer to the River Ebbw. These are generally shown as low to medium risk however there are some areas of high risk and the flooding could potentially affect a number of properties in larger events. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies but incidents suggest the capacity of the drainage may be insufficient to cope with all storms. This may be exacerbated when water levels in the River Ebbw and River Sirhowy are higher.

Ordinary Watercourses – Some small areas in the vicinity of the ordinary watercourses are shown at risk of flooding, potentially affecting properties. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 26 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Between Twyncarn Road & A467.	The surface water flood map indicates overflow could flood the A467.	2/3	Y
Canal (adjacent Twyncarn Road).	The surface water flood map indicates floodwaters could back up behind the canal.	2/3	N
North Road, Pontywaun (manhole).	Incidents reported. The surface water flood map shows reasonably limited flooding.	2	Y
North Road, Pontywaun. In allotments, side of no. 166.	Incidents reported. The surface water flood map shows reasonably limited flooding.	2	Y
Canal (nr Medart Place).	Outlet from the canal. Some reported incidents in vicinity, however the surface water flood map shows reasonably limited flooding.	3	N
Railway culvert between the canal & Medart Place.	The surface water flood map shows minimal flooding but some reports of blocked culverts in vicinity.	2	N
Medart Place.	The surface water flood map shows minimal flooding but some reports of blocked culverts in vicinity.	2	N

Table 26: Important Culverts - Crosskeys

Groundwater – Large parts of Crosskeys are shown to have some susceptibility to groundwater flooding based on the underlying geology. However within each grid square the proportion considered susceptible is low (<25%) with the exception of the Risca Road area (25% - 50%). There are several old coal mine shafts in Crosskeys which are potentially a source of groundwater flooding where dewatering operations have ceased. However no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Crosskeys was identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register. Sewer flooding is usually the responsibility of Dŵr Cymru/ Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Monmouthshire & Brecon Canal – This is a potential source of flooding to Crosskeys however there are no known reports of flooding directly from the canal. Detailed information relating to the operation, flows and condition of the canal are not currently available. Similarly there is limited information on any connections between the ordinary watercourses and canal. This will require more detailed investigations.

Interaction with main river – There is likely to be some interaction with the River Ebbw and River Sirhowy, particularly in the lower reaches of the ordinary watercourses and drainage networks where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Crosskeys relate to ordinary watercourses, particularly constrictions at culverts, or where the local drainage system is not effective in capturing runoff. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies or culverts. Many of the areas affected are also at risk from flooding from the River Ebbw or River Sirhowy. Table 27 summarises the impacts of flooding in Crosskeys, based on the surface water flood map. Figure 20 shows the Flood Risk Map for Crosskeys.

COUNTS FOR CROSSKEYS COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3675	150	54	16
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	1564	23	20	4
Services (n)	11	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	234	21	2	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	2.1	0.1	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	2	1	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	62.3	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	66	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	151.8	2.7	1.3	4.4

Table 27: Impacts of Flooding in Crosskeys - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

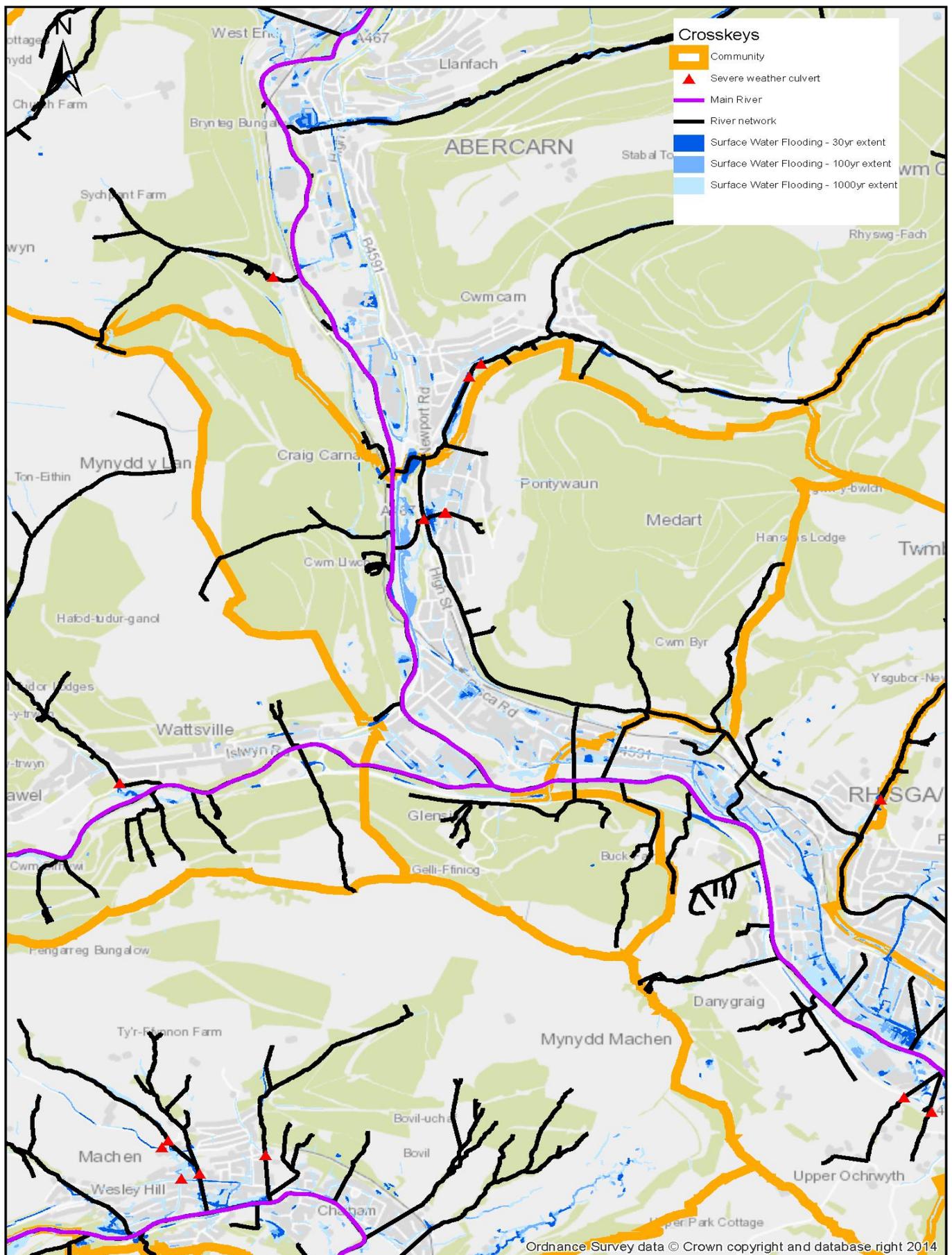


Figure 20: Flood Risk Map for Crosskeys

The main flood risks have been identified as follows:***North Road area:***

This area is at a medium to high risk of flooding potentially affecting residential properties. This is most likely to occur due to a blockage of the Twyncarn Road culvert however, the capacity of the culvert is unknown. Further investigations are proposed.

A467 at Pont-y-Waun:

This area is at a medium to high risk of flooding affecting the open ground east of the road. Although the area affected is largely open ground there is potential for floodwaters to affect the highway during extreme flood events or in the event of a severe culvert blockage. The area affected is also within the floodplain of the River Ebbw. The capacity of these culverts is currently unknown. Further investigations are proposed.

Risca Road area:

This area is at a medium to high risk of flooding affecting residential properties and local access routes. This is most likely due to blockages or limited capacity in the drainage system, particularly when river levels are high. A comprehensive assessment of the drainage system is required to better quantify the risks. Further investigations are proposed.

Other areas shown at risk of surface water flooding include areas around Medart Place and Tredegar Terrace. However as these are generally shown as low risk affecting only a few properties, specific measures are not currently proposed at this time.

Areas shown to be at risk from the River Ebbw or River Sirhowy (not specifically addressed in this strategy) include: sports and recreational facilities adjacent to the river; residential properties in the vicinity of Gladstone Street and Tredegar Terrace; and the industrial estate near Tredegar Street.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Crosskeys.

CROSSKEYS - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
CK01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
CK02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 26 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
CK03 CCTV survey of priority culverts identified in task CK02. Capacity check of priority culverts identified in task CK02.	0 – 5 (2015–2021)	£1.5 (< £100k)	M24	CCBC03 CCBC04
CK04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

CROSSKEYS - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CK05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
CK06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
CK07	Use the outcomes from task CK02, CK03, CK05 and CK06 to assess the requirement for and scope of studies to reduce flooding from the Nant Carn and ordinary watercourse near North Street. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (2 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
CK08	Use the outcomes from task CK02, CK03, CK05 and CK06 to assess the requirement for and scope of studies to reduce flooding from surface water and local drainage systems in the Risca Road area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28

CROSSKEYS - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
CK09 Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on Nant Carn and ordinary watercourse near North Street.	0 – 2 (2015–2021)	£10k (2 sites) (< £100k)	M41 / M42	CCBC25
CK10 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (all CCBC) (< £100k)	M23	CCBC25
CK11 Assess flood risks to the listed buildings at high risk and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£1k (< £100k)	M23	CCBC03

**TOTAL COST OF MEASURES FOR
CROSSKEYS COMMUNITY AREA:**

£96,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 7
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



WATER FEATURE IN CROSSKEYS

6.13. Crumlin Community Area

Overview:

Crumlin is situated on the eastern boundary of the Caerphilly County Borough Council area. It covers a largely rural area of approximately 12.9 km² and includes the settlements of Crumlin, Pen-twyn and the eastern fringe of Penmaen. The majority of the development in the area is residential, although there are two industrial estates located along the western boundary and an industrial estate adjacent to the River Ebbw. There are also likely to be a number of small businesses and commercial properties, particularly towards the town centre, and other non-residential properties and services. Neighbouring communities are Argoed, Penmaen, and Newbridge. Crumlin also borders the neighbouring local authority of Blaenau Gwent County Borough Council.

The River Ebbw forms the north-eastern boundary of the community and flows in a southerly direction through the urban area of Crumlin. The majority of the area drains in westerly direction towards the Ebbw. The eastern part of Crumlin drains to an unnamed watercourse flowing to the west towards the River Ebbw. The Nant Brunant, Nant Gwynt and Trinant, all located in the northern part of Crumlin, flow in an easterly direction towards the River Ebbw. There are also numerous unnamed watercourses and field drains present in Crumlin. The River Ebbw is a designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the River Ebbw.

Sources of flooding:

The available information indicates the main local source of flooding in Crumlin is from surface water, where drainage systems cannot cope with high intensity rainfall. The data indicates a number of highways and properties across the community may be affected. Flooding from ordinary watercourses is less extensive however problems may occur in more isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. Flooding from the River Ebbw (main river) is not particularly extensive and mainly affects the low lying area of Crumlin in the vicinity of Main Street.

Available data:

The following flood risk information is currently available for Crumlin:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding mainly affecting highways in the developed areas of Station Road, Hafod-yr-Ynys Road, Kendon Road, Pen-y-fan Industrial Estate and Pentwyn Road. These areas are generally shown as medium to high risk however more extensive areas are shown at low risk. The maps also indicate that a number of properties may be at risk in larger events. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies but incidents also suggest the capacity of the drainage may be insufficient to cope with all storms. This may be exacerbated when water levels in the River Ebbw are higher.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, potentially affecting properties in the Kendon Road and Hafod-yr-Ynys areas. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 28 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Hillcrest Lane.	This is a severe weather culvert. No watercourse visible on the map, the surface water flood map doesn't show flow route however some incidents reported with blocked gullies/runoff.	3	N
Hillcrest Lane 2.	This is a severe weather culvert. No watercourse visible on the map, the surface water flood map doesn't show flow route however some incidents reported with blocked gullies/runoff.	3	N
Pen y fan Fach Lane 3.	This is a severe weather culvert. No watercourse visible on the map, the surface water flood map doesn't show flow route however some incidents reported with blocked gullies/runoff.	3	N
Pen y fan Fach Lane 2.	This is a severe weather culvert. No watercourse visible on the map, the surface water flood map doesn't show flow route however some incidents reported with blocked gullies/runoff.	3	N
Pen y fan Fach Lane.	This is a severe weather culvert. No watercourse visible on the map, the surface water flood map doesn't show flow route however some incidents reported with blocked gullies/runoff.	3	N
Pentrepoed, Trinant (Nant Gwynt).	This is a severe weather culvert. No watercourse visible on the map, the surface water flood map doesn't show flow route however some incidents reported with blocked gullies/runoff.	3	N
Pen y fan Country Park lake outlet.	Lake outlet. Included in reservoir flood map therefore there should be management procedures in place.	3	N
Pen y fan Country Park lake outlet 2.	Lake outlet. Included in reservoir flood map therefore there should be management procedures in place.	3	N

Location	Comment	CCTV required (priority)	Capacity check required
Near Llanerch Lane.	This is a severe weather culvert. The surface water flood map shows possible flow path but mostly from upstream.	3	N
Woodland Drive.	Incidents reported downstream with a blocked culvert. The surface water flood map shows a reasonable flow path.	2	Y
Pentwyn Road.	Incidents reported downstream with a blocked culvert. The surface water flood map shows a reasonable flow path.	2	Y
Pen-y-fan Industrial Estate. Surface water pond outlet.	Surface water pond ~ 2000 m ² . The surface water flood map indicates overflows may affect access and properties in industrial estate	3	N
Kendon Hill, Croespenmaen (opposite 1 Ty Brachty Terrace).	This is a severe weather culvert. Incidents reported, possible under capacity drainage. The surface water flood map shows flow route along B4261, also reports downstream of culvert surcharge.	1/2	Y
Kendon Hill 2.	This is a severe weather culvert. Incidents reported, possible under capacity drainage. The surface water flood map shows flow route along B4261, also reports downstream of culvert surcharge.	1/2	Y
Nr Kendon Hill.	The surface water flood map shows flow route along B4261, also reports downstream of culvert surcharge.	1/2	Y
Plynlimon Avenue area.	A drainage assessment required. The surface water flood map shows reasonably extensive flooding in the vicinity. Some incidents reported associated with blocked drainage and capacity.	N/A	N/A
Bryn-Deri Terrace.	This is a severe weather culvert. Some surface water flooding is shown. Reported incidents with a blocked culvert.	2	N

Location	Comment	CCTV required (priority)	Capacity check required
Elidyr Road.	Some surface water flooding is shown.	3	N
Treowen Road area.	The surface water flood map shows reasonably extensive (low risk) flooding. Some incidents reported possibly due to hillside runoff. Investigate the possibility of controlling and capturing surface water runoff.	N/A	N/A
Hafodyrynys.	This is a severe weather culvert. The surface water flood map shows reasonable flow route. Few incidents have been reported.	2/3	Y
A472 Hafodyrynys Hill.	This is a severe weather culvert. The surface water flood map shows reasonable flow route. Few incidents have reported.	2/3	Y
Miners Welfare.	This is a severe weather culvert. The surface water flood map shows a large ponded area, possibly affecting properties, although mostly from upstream. Few incidents have been reported.	2	Y
Pont Bren village.	This is a severe weather culvert. The surface water flood map shows reasonable flow route, possibly affects properties. Blocked culvert reported.	3	Y
Herbert Street.	Surface water flooding upstream but possibly more channel bypassing. Check upstream channel. Incidents in the vicinity report a blocked culvert.	2	Y
A472 Hafodyrynys Hill (Noel's lay by).	This is a severe weather culvert. The surface water flood map shows limited flooding. Smallish catchment.	3	N

Table 28: Important Culverts - Crumlin

Groundwater – Where it has been classified, the majority of Crumlin is shown to have low susceptibility to groundwater flooding with the exception of the north east corner which is shown to be highly susceptible. There are several old coal mine shafts in Crumlin which are potentially a source of groundwater flooding where dewatering operations have ceased. However no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – An area at high risk of sewer flooding was identified in Crumlin in the Preliminary Flood Risk Assessment, based on the DG5 incidents register. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Ebbw, particularly in the lower reaches of the ordinary watercourses and drainage networks where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Crumlin relate to surface water flooding and ordinary watercourses. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies or storm sewers. Main river flooding is limited to the low lying area immediately adjacent to the River Ebbw. Table 29 summarises the impacts of flooding in Crumlin, based on the surface water flood map. Figure 21 shows the Flood Risk Map for Crumlin.

COUNTS FOR CRUMLIN COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	5767	336	71	47
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential properties (n)	2454	47	18	17
Services (n)	31	2	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	624	45	17	14
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	2.0	0.5	0.1	0.2
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	2	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	14	0	0	0
Scheduled Ancient Monuments (ha)	11	3.9	2.3	0.6
Listed Buildings (n)	32	0	0	1
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	369.7	11.5	4.3	3.3

Table 29: Impacts of Flooding in Crumlin - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

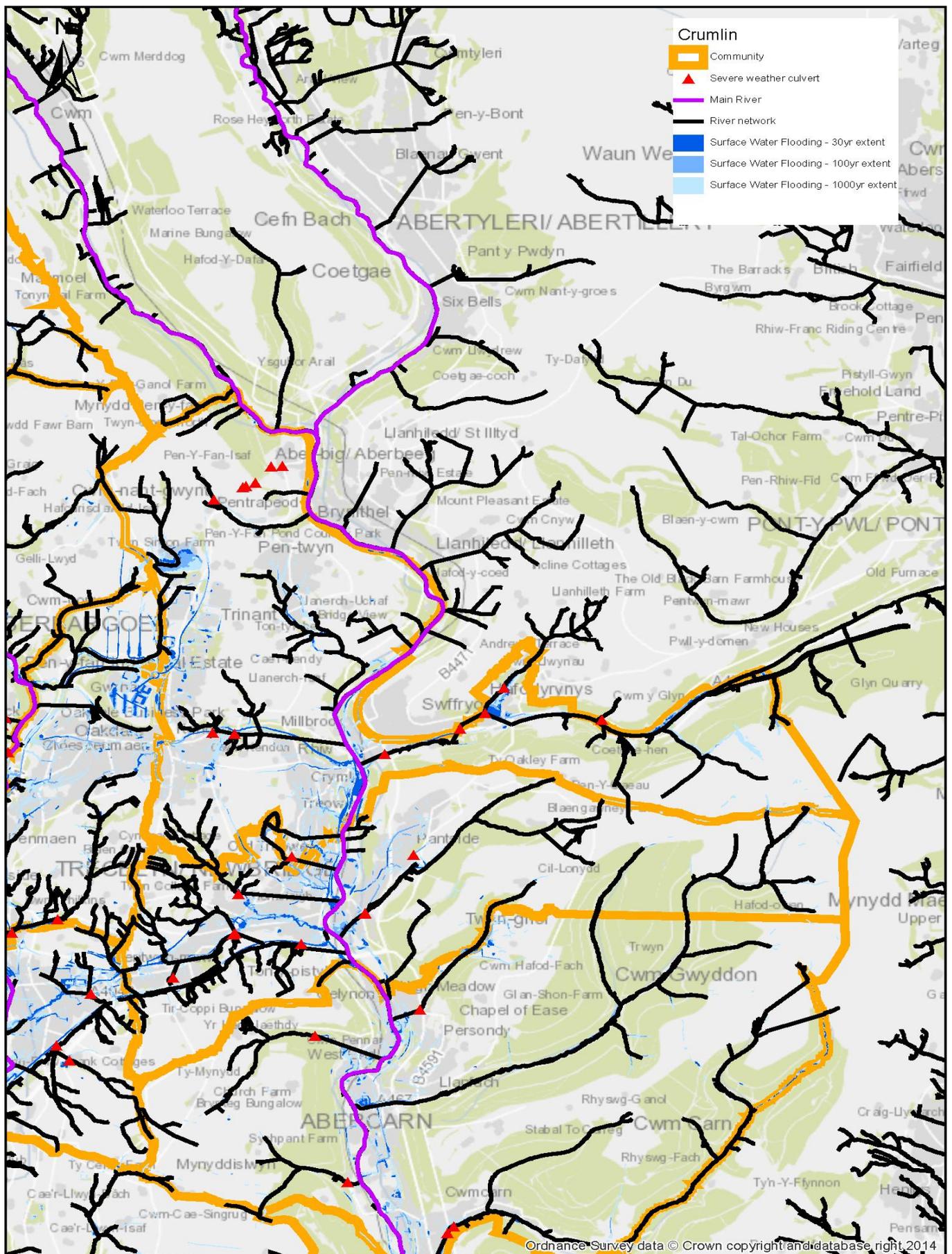


Figure 21: Flood Risk Map for Crumlin

The main flood risks have been identified as follows:***Station Road area:***

This area is at a medium to high risk of flooding affecting highways, residential properties and recreation and sports facilities adjacent to the River Ebbw. The Navigation Industrial Estate adjacent to the River Ebbw is also shown at risk on the surface water flood maps. This is most likely to occur due to a blockage or the capacity of the local drainage network in the area, particularly when river levels are high. The Natural Resources Wales Flood Maps indicate this area is also at risk from main river flooding during larger flood events. As flooding in this area is shown to be extensive in larger events, access to properties is likely to be restricted. Further investigations are proposed.

Hafod-yr-Ynys Road area:

This area is generally at a low to medium risk of flooding affecting highways, properties and recreation and sports facilities. Some areas are shown at high risk, particularly the recreation ground. Flooding of the properties and recreational facilities is most likely to occur due to a blockage or restricted capacity of the Miners Welfare culvert and the Pont Bren Village culvert, however the capacity of these culverts is unknown. A number of reported flood incidents in the area refer to blocked culverts. Flooding of the highways in the area, particularly Hafod-yr-Ynys Road, is more than likely due to blockages or the capacity of the local drainage network and there are a number of reported flood incidents referring to blocked gullies and storm drains. Further investigations are proposed.

Kendon Road area:

This area is generally at a high to medium risk of flooding affecting mainly highways, however the surface water flood maps indicate that a small number of properties are potentially at risk of flooding. Flooding in this area is likely due to a combination of blockages or the capacity of the ordinary watercourse culverts and local drainage network. A section of the B4251 highway stretching from Kendon to the centre of Crumlin is shown to be at high risk, affecting access to a number of properties. Further investigations are proposed.

Pen-y-fan industrial estate:

This area is generally at a medium to low risk of flooding affecting highways and access roads. The surface water flood maps indicate that a number of industrial buildings and the parkway highway in the centre of the industrial estate are at risk. Flooding in this area is likely to be caused by a blockage or the capacity of the local drainage network, although flooding from the ordinary watercourses may also be a factor. There are two reported flood incidents in the north of the industrial estate referring to culvert blockages and water from Pen-y-fan pond flooding the industrial estate. No further investigations are proposed at this time although flood incidents will continue to be monitored.

Pentwyn Road area:

This area is predominantly at a medium to low risk of flooding although some highways are shown as high risk. A limited number of properties are shown at risk during larger events. Flooding in this area is likely to be caused by blockages or the capacity of the local drainage network. No further investigations are proposed at this time although flood incidents will continue to be monitored.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Crumlin.

CRUMLIN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
CR01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
CR02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 28 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
CR03 CCTV survey of priority culverts identified in task CR02. Capacity check of priority culverts identified in task CR02.	0 – 5 (2015–2021)	£4k (< £100k)	M24	CCBC03 CCBC04
CR04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

CRUMLIN - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
CR05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
CR06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
CR07	Use the outcomes from task CR02, CR03, CR05 and CR06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourses near Kendon Road and Hafod-yr-Ynys Road. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (2 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
CR08	Use the outcomes from task CR02, CR03, CR05 and CR06 to assess the requirement for and scope of studies to reduce flooding from surface water and local drainage systems in the vicinity of Station Road. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28

CRUMLIN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
CR09 Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on ordinary watercourses near Kendon Road and Hafod-yr-Ynys Road.	0 – 2 (2015–2021)	£10k (2 sites, inc. installation) (< £100k)	M41 / M42	CCBC25
CR10 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
CR11 Assess flood risks to the listed buildings at high risk and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£500 (< £100k)	M23 / M51	CCBC03
CR12 Subject to funding, complete a prefeasibility study to investigate the causes and potential solutions to flooding from the intake structure at Pont Bren Road.	0 – 5 (2015–2021)	£40k (< £100k)	M24 / M33	CCBC27 CCBC28

TOTAL COST OF MEASURES FOR CRUMLIN COMMUNITY AREA:

£148,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 8
7 Preparing	3 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



CASCADE AND INTAKE STRUCTURE IN CRUMLIN

6.14. Llanbradach Community Area

Overview:

The Llanbradach community is situated towards the south of the Caerphilly County Borough Council area and includes the urban area of Llanbradach. It covers an area of approximately 5.7 km², largely open fields, farmland and woodland with development situated along the eastern fringe. Much of the existing development is residential although there is an industrial estate adjacent to the railway. Neighbouring communities are Ystrad Mynach, Maesycwmmmer, Bedwas, Caerphilly North, Caerphilly West, Abertridwr and Senghenydd.

The River Rhymney forms the eastern boundary of the community and the majority of the area drains in an easterly or south-easterly direction towards the Rhymney. Other watercourses include the Nant Llanbradach, Nant Owen and Nant Cwm-Sarn (which drains in a south-westerly direction to the neighbouring Senghenydd community) as well as a number of smaller drains and un-named watercourses. The River Rhymney is designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

The available data indicates flooding from ordinary watercourses is not particularly extensive however this has not previously been assessed. Problems may occur in more isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of areas in the community. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area.

Available data:

The following flood risk information is currently available for Llanbradach:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban area of Llanbradach, with the main areas affected in the vicinity of Pant Glas, Glenview Terrace, and land immediately adjacent to the River Rhymney. The majority of areas are shown at low risk with more isolated areas at medium to high risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly near Heol Beulah. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity.

Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 30 shows important culverts that have been identified from the 'Severe Weather Culvert Register' and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Railway culvert at Coedybrain Court.	Limited flooding is shown but incidents reported from railway culvert in the vicinity.	2	Y
GlenView Terrace, Llanbradach. (Opposite garage).	This is a severe weather culvert. Limited flooding is shown but incidents reported.	3	Y
North of Victoria Street.	Reasonable flooding shown and incidents reported downstream	2	Y
Caerphilly Road, Llanbradach, (Opposite Junction to Rise Estate).	This is a severe weather culvert. Limited flooding is shown but incidents reported in the vicinity.	2	Y

Table 30: Important Culverts - Llanbradach

Groundwater – The majority of Llanbradach is shown to have low susceptibility to groundwater flooding, based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A medium risk area was identified in Llanbradach. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. Land immediately adjacent to the River Rhymney is shown at risk of main river flooding, including a significant area of development, however defences are present which reduce this risk.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Llanbradach relate to surface water flooding, where the local drainage system is not effective in capturing runoff or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Part of Llanbradach is shown at risk from the River Rhymney (main river) in larger flood events although defences are present to reduce this risk. Table 31 summarises the impacts of flooding in Llanbradach, based on the surface water flood map. Figure 22 shows the Flood Risk Map.

COUNTS FOR LLANBRADACH COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	4489	317	66	54
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	1910	69	13	13
Services (n)	16	1	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	257	16	0	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	4.2	0.4	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	63	11	2.8	3.4
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	4	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.7	0	0	0
Listed Buildings (n)	11	2	0	0
Licensed Abstractions (LA) (n)	2	1	0	1
Sites of Interest for Nature Conservation (SINC) (ha)	113.1	4.6	2.3	4.0

Table 31: Impacts of Flooding in Llanbradach - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

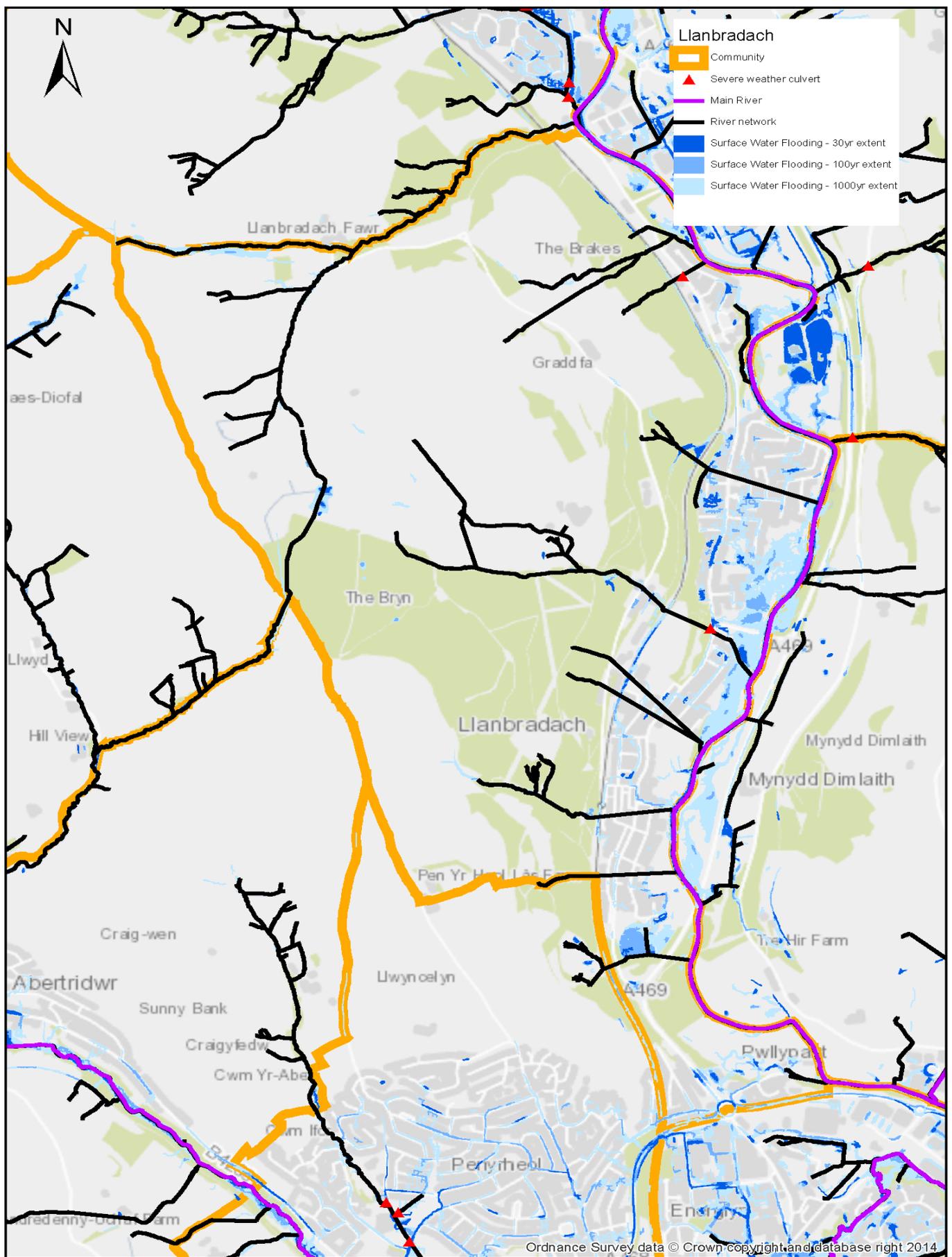


Figure 22: Flood Risk Map for Llanbradach

The main flood risks have been identified as follows:***Heol Beuleh area:***

This area is predominantly at a low to medium risk of flooding although some areas shown are at high risk. This is likely due to a blockage or the capacity of the ordinary watercourse culvert and the local drainage system. This area is also shown at risk of flooding from the River Rhymney although defences are present to reduce that risk. Some properties are shown to be at high risk of flooding. Further investigations are proposed.

Glenview Terrace area:

This area is generally at a medium to low risk of flooding affecting highways. This is likely due to flooding from the local drainage network and/or the Nant Owen. Relatively few properties are shown at risk. This area is also shown at risk from the River Rhymney. Further investigations are proposed.

Pant Glas/Glenview Terrace area:

This area is generally at a low to medium risk affecting highways and properties although the surface water flood map indicates some areas of high risk. The surface water flood map also indicates that some residential properties may be at risk of flooding and access is likely to be restricted to properties during a flood event. There are several reported flood incidents in the area. This is most likely due to a combination of a blockage or the capacity of the drainage network, exacerbated when river levels are high. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Llanbradach.

LLANBRADACH - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
LL01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
LL02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 30 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
LL03 CCTV survey of priority culverts identified in task LL02. Capacity check of priority culverts identified in task LL02.	0 – 5 (2015–2021)	£2k (< £100k)	M24	CCBC03 CCBC04
LL04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

LLANBRADACH - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
LL05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
LL06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
LL07	Use the outcomes from task LL02, LL03, LL05 and LL06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
LL08	Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on Nant Owen and un-named watercourse to the north.	0 – 2 (2015–2021)	£10k (2 sites) (< £100k)	M41 / M42	CCBC25
LL09	Complete GIS exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm)	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

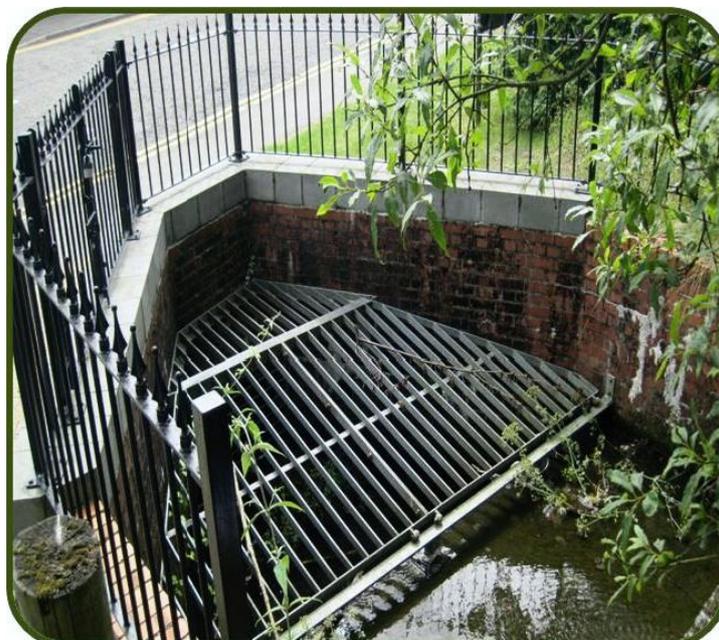
**TOTAL COST OF MEASURES FOR
LLANBRADACH COMMUNITY AREA:**

£65,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
7 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**BESPOKE TRASH SCREEN
IN LLANBRADACH**

6.15. Maesycwmmmer Community Area

Overview:

The Maesycwmmmer community is situated towards the centre of the Caerphilly County Borough Council area and includes the urban fringe of Ystrad Mynach. It covers an area of approximately 7.5 km², which is largely open fields and farmland with development situated along the western fringe. Much of the existing development is residential although there is an industrial estate adjacent to the River Rhymney to the south west and an industrial estate to the north. Neighbouring communities are Bedwas, Llanbradach, Ystrad Mynach, Hengoed, Pengam, Pontllanfraith and Ynysddu.

The River Rhymney forms the western boundary of the community and the majority of the area drains in a westerly direction towards the Rhymney. Other watercourses include the Nant y Ffrwd, Nant Cwmhenfelin and Nant y Twyn as well as a number of smaller drains and un-named watercourses. The River Rhymney is designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

The Natural Resources Wales Flood Map indicates flooding from the River Rhymney (main river) is an important source of flooding in Maesycwmmmer, affecting lower lying land adjacent to the river, however defences are present which reduce this risk. The available data indicates flooding from ordinary watercourses is not particularly extensive but this has not previously been assessed. Problems may occur in more isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they pass through developed areas, it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of areas in the community. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area.

Available data:

The following flood risk information is currently available for Maesycwmmmer:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties in the developed areas of Maesycwmmmer, with the main areas affected being the Duffryn Business Park, the A472 and in the vicinity of the un-named watercourses near the residential area. Some areas are shown at high risk of flooding although properties are generally not shown at risk except in larger events. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly the A472, Duffryn Business Park and there are several incident reports for watercourses crossing the A469. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 32 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Brooklands, Victoria Road.	Incidents recorded in the vicinity.	3	Y
Dismantled railway.	Incidents recorded in the vicinity. Significant flow path shown along Main Road.	2	Y
A472 Maesycwmmmer Tip, adjacent. Cycle track.	This is a severe weather culvert. Incidents recorded in the vicinity. Significant flow path along Main Road.	2	Y
Gellideg Heights.	This is a severe weather culvert. Significant flooding along Main Road. Blockage incidents recorded	1	Y
Gellideg Heights 2, Maesycwmmmer.	This is a severe weather culvert. Significant flooding along Main Rd. Blockage incidents recorded.	2	Y
Main Road.	This is a severe weather culvert. Incidents recorded in the vicinity.	3	N
Park Rd, Maesycwmmmer.	This is a severe weather culvert. Incidents recorded in the vicinity. Significant flow path shown.	1	Y
Community Centre, Park Road.	This is a severe weather culvert. Incidents recorded in the vicinity. Significant flow path shown.	1	Y
Main Road 2.	This is a severe weather culvert. Some incidents recorded in the vicinity.	2	N
Pandy Lane 3, Ystrad Mynach.	This is a severe weather culvert. Limited flooding is shown.	3	Y
Pandy Lane 2, Ystrad Mynach.	This is a severe weather culvert. Limited flooding is shown.	3	N

Location	Comment	CCTV required (priority)	Capacity check required
Llanbradach By – pass.	This is a severe weather culvert. Limited flooding is shown but reported incidents in industrial estate.	3	Y
Duffryn Business Park 1.	Significant flooding is shown. Incidents reported.	2	N
Duffryn Business Park 2.	Significant flooding is shown. Incidents reported.	2	Y
Duffryn Business Park 3.	Significant flooding is shown. Incidents reported.	2	Y
Ffrwd Farm - ponds & outlet.	A water body survey is required, including the pond outlet structure.	3	N
Pandy Lane (Leading down to Fish Farm).	This is a severe weather culvert. Limited flooding is shown.	3	N
Nant Cwmhenfelin A469.	This is a severe weather culvert. Limited flooding is shown.	3	Y

Table 32: Important Culverts - Maesycwmmmer

Groundwater – Where it has been classified, Maesycwmmmer is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A low risk area was identified in Maesycwmmmer. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. Land immediately adjacent to the River Rhymney is shown at risk of main river flooding, including a significant area of development at the Duffryn Business Park, however defences are present which reduce this risk.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Maesycwmmmer relate to surface water flooding, where the local drainage system is not effective in capturing runoff or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Part of Maesycwmmmer is shown at risk from the River Rhymney (main river) in larger flood events although defences are present to reduce this risk. Table 33 summarises the impacts of flooding in Maesycwmmmer based on the surface water flood map. Figure 23 shows the Flood Risk Map.

COUNTS FOR MAESYCWMMER COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	2254	134	16	9
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	959	5	5	0
Services (n)	14	2	0	1
Risk to Economic Activity				
Non-Residential Properties (n)	336	26	14	3
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	110.1	12.5	3.7	9.0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	3	1	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.9	0	0	0
Listed Buildings (n)	3	0	0	0
Licensed Abstractions (LA) (n)	2	1	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	144.3	6.2	1.7	4.5

Table 33: Impacts of Flooding in Maesycwmmmer - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

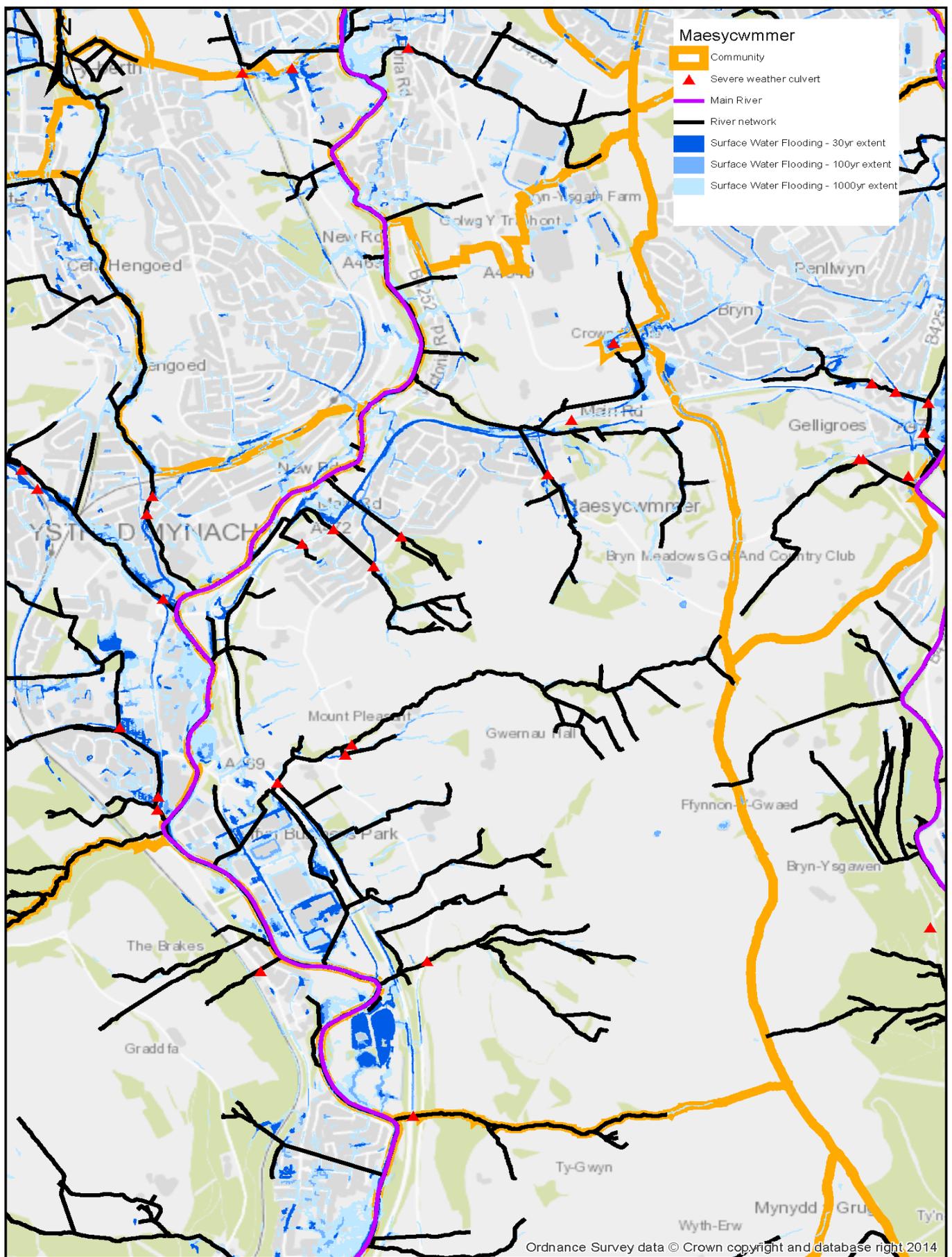


Figure 23: Flood Risk Map for Maesycwmmmer

The main flood risks have been identified as follows:***Duffryn Business Park:***

Includes some high risk areas of flooding which are more than likely due to blockages or the capacity of the ordinary watercourse culverts, the local drainage system and restricted discharges when river levels are high. This area is also shown at risk of flooding from the River Rhymney although defences are present to reduce that risk. Some properties are potentially at high risk of flooding. Further investigations are proposed.

A469:

This area is generally at a medium to low risk of flooding although flood incident reports cite flooding of the highway. This is likely due to flooding from ordinary watercourses due to culvert capacity or a blockage. Relatively few properties are shown at risk. Further investigations are proposed.

A472 area:

This area is generally at a low to medium risk of flooding affecting highways and some properties although the surface water flood map indicates high risk to the A472. The surface water flood map also indicates some residential properties may be at risk of flooding and access is likely to be restricted to properties during a flood event. This is likely due to a combination of a blockage or the capacity of the drainage network which is exacerbated when river levels are high. Blockage or restricted capacity of the ordinary watercourse culverts is also likely to contribute. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Maesycwmmmer.

MAESYCWMMER - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
MC01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
MC02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 32 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
MC03 CCTV survey of priority culverts identified in task MC02. Capacity check of priority culverts identified in task MC02.	0 – 5 (2015–2021)	£3k (< £100k)	M24	CCBC03 CCBC04
MC04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
MC05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

MAESYCWMMER - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
MC06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
MC07 Use the outcomes from task MC02, MC03, MC05 and MC06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourses. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£100k (5 sites) (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
MC08 Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on un-named watercourses.	0 – 2 (2015–2021)	£25k (5 sites) (< £100k)	M41 / M42	CCBC25
MC09 Use the outcomes from task MC02, MC03, MC05 and MC06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems at Duffryn Business Park. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28

MAESYCWMMER - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
MC10 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
MC11 Survey waterbody south of Duffryn Business Park to establish purpose, condition and potential storage function.	0 – 2 (2015–2021)	£3.0k (< £100k)	M24	CCBC03

**TOTAL COST OF MEASURES FOR
MAESYCWMMER COMMUNITY AREA:**

£174,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 7
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



INTAKE STRUCTURE IN MAESYCWMMER

6.16. Markham Community Area

Overview:

The Markham community is situated towards the north east of the Caerphilly County Borough Council area and includes the town of Markham. It covers an area of approximately 3.1 km², which is largely open fields and farmland with development situated in the southern and north eastern parts of the community. Much of the existing development is residential and there is also likely to be a number of small businesses, commercial properties and services present. Neighbouring communities are Manmoel, Argoed, Aberbargoed and New Tredegar. Markham also borders the neighbouring local authority of Blaenau Gwent County Borough Council area.

The River Sirhowy forms the eastern boundary of Markham and the area generally drains in an easterly direction towards the Sirhowy. There are several unnamed ordinary watercourses and local field drains shown on the Ordnance Survey mapping, however it is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses. The River Sirhowy is designated main river and therefore the responsibility of Natural Resources Wales.

Sources of flooding:

The surface water flood maps indicate the main source of flooding in Markham is from surface water, where drainage systems cannot cope with high intensity rainfall and is shown to affect highways and potentially properties in the urban area of Markham. The available information indicates flooding from ordinary watercourses is less extensive although problems may occur in more isolated locations, for example due to culvert restrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The Natural Resources Wales Flood Map indicates the extent of flooding from the River Sirhowy (main river) is limited to the lower lying land adjacent to the river and no properties are shown at risk in Markham.

Available data:

The following flood risk information is currently available for Markham:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties in the developed areas of Markham, with James Street most affected. Some areas are shown at high risk of flooding including a number of properties during larger events. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Limited flooding is shown in the vicinity of ordinary watercourses although a high to medium risk area is shown at Holly Bush. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. There are no culverts in Markham identified in the ‘Severe Weather Culvert Register’ and no important culverts were identified during the desktop review. Other critical structures may be identified as investigations progress.

Groundwater – Where it has been classified, Markham is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. No areas at risk were identified in Markham. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water.

Interaction with main river – There is likely to be some interaction with the River Sirhowy for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. The undeveloped land immediately adjacent to the River Sirhowy is shown at risk of main river flooding.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Markham relate to surface water flooding, where the local drainage system is not effective in capturing runoff and ordinary watercourses in more isolated locations. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The low lying areas of Markham adjacent to the River Sirhowy are shown at risk of main river flooding in larger flood events although only undeveloped lands are shown to be at risk. Table 34 summarises the impacts of flooding in Markham based on the surface water flood map. Figure 24 shows the Flood Risk Map.

COUNTS FOR MARKHAM COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	1798	52	21	2
<u>Residential Properties at risk of internal flooding depth >0,2m</u>				
Properties (n)	765	9	2	1
Services (n)	9	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	138	2	0	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	0	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	56.3	2.1	0.5	1.5

Table 34: Impacts of Flooding in Markham - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

The main flood risks have been identified as follows:***James Street area:***

This area is generally at a low to medium risk of flooding with more isolated areas shown at high risk. The surface water flood maps indicate sections of James Road are at high risk and potentially properties for larger events. Flooding in this area is likely to be caused by a blockage or inadequate capacity of the local drainage network and many of the reported flood incidents refer to blocked gullies and drains. Further investigations are proposed.

Holly Bush (Railway Terrace) area:

This area is generally at a low risk of flooding although a section of Railway Terrace is shown to be at high risk. Flooding in this area is likely due to the ordinary watercourse which is culverted under the highway and there is a reported flood incident caused by this culvert overflowing. Further investigations are proposed.

Measures To Reduce Flood Risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Markham.

MARKHAM - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
Flood Forecasting, Warning & Response					
MK01	Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans					
MK02	<p><u>Site walkovers to:</u></p> <p>Assess condition of culvert structures & identify culverts requiring more detailed assessment.</p> <p>Identify features acting as informal or defacto defences in the vicinity of the culverts.</p> <p>Assess the general material and condition of open channels & identify any local pinch-points.</p> <p>Identify any obvious locations where invasive species are present.</p> <p>Assess property threshold levels to better quantify the risk to properties.</p> <p>Identify locations where water quality may be affected by coal water discharges.</p>	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
MK03	<p>CCTV survey of priority culverts identified in task MK02.</p> <p>Capacity check of priority culverts identified in task MK02.</p>	0 – 5 (2015–2021)	£500 (< £100k)	M24	CCBC03 CCBC04
MK04	Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
MK05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

MARKHAM - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
MK06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£1.5k (< £100k)	M24 / M44 / M53	CCBC10
MK07	Use the outcomes from tasks MK02, MK03, MK05 and MK06 to assess the requirement for and scope of a feasibility study to reduce flooding the ordinary watercourse at Railway Terrace. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£15k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
MK08	Use the outcomes from task MK02, MK03, MK05 and MK06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the James Street area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
MK09	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£1.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
MARKHAM COMMUNITY AREA:**

£47,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**HEAVY DUTY DRAINAGE CHANNEL
TO CAPTURE SURFACE WATER RUN OFF
IN MARKHAM**

6.17. Newbridge Community Area

Overview:

The Newbridge community is situated towards the east of the Caerphilly County Borough Council area and includes the town of Newbridge. It covers an area of approximately 10.3 km², the majority of which is open fields and farmland with developed land in the west of the community. Much of the existing development is residential although there is a Technology Park adjacent to the River Ebbw. There are also likely to be a number of small businesses and commercial properties, particularly towards the town centre, and other non-residential properties and services. Neighbouring communities are Crumlin, Penmaen, Pontllanfraith and Abercarn. Newbridge also borders the neighbouring local authority of Torfaen County Borough Council.

The Newbridge area generally drains towards the River Ebbw which flows in a southerly direction through the centre of Newbridge. The Nant Gawni flows through Newbridge in a south westerly direction before joining the River Ebbw. The Nant Hafod-Fach also flows south west through the community before joining the River Ebbw in the neighbouring Abercarn community. The Nant Gwyddon-Fach and Nant Gwyddon both flow in a southerly direction and drain the rural eastern part of Newbridge eventually joining the River Ebbw in Abercarn. There are several un-named ordinary watercourses present in Newbridge discharging to the larger rivers. The River Ebbw is a designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the River Ebbw. Part of the Monmouthshire & Brecon Canal also flows through Newbridge.

Sources of flooding:

The Natural Resources Wales Flood Maps indicate flooding from main rivers is not particularly extensive with the low lying areas around Bridge Street at the highest risk. A number of properties are shown to be at risk in this area. Flooding from ordinary watercourses has not previously been assessed in detail. Problems may occur in more isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they pass through developed areas, it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties in the community. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area, with significant risks in some areas.

Available data:

The following flood risk information is currently available for Newbridge:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban areas of Newbridge, with the main areas affected in the vicinity of Bridge Street, Bryngwyn Road/High Street, North Road, Old Pant Road and part of the A472. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains and not all areas identified as at risk on the surface water flood map have reported incidents.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, potentially affecting properties, particularly in the vicinity of Bryngwyn Road. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 35 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Maesgwyn.	Some incidents reported. The surface water flood map shows reasonably extensive flooding.	3	N
Pennar Lane.	Reports of a blocked culvert. The surface water flood map indicates properties could be affected.	3	Y
Twyn College Lane 2.	This is a severe weather culvert. Limited flooding is shown.	3	N
Twyn College Lane 1.	This is a severe weather culvert. Limited flooding is shown.	3	N
New Bryngwyn Road.	The surface water flood map indicates overflows could affect properties	2	Y
Bryngwyn (Donkey Fields).	This is a severe weather culvert. Several incidents recorded and the surface water flood map shows properties affected.	1	Y
Bryngwyn Rd 2 (Donkey Fields).	This is a severe weather culvert. Several incidents recorded and the surface water flood map shows properties affected.	1	Y

Location	Comment	CCTV required (priority)	Capacity check required
Martins Field.	This is a severe weather culvert. The surface water flood map indicates overflows could affect properties. Also culvert may affect Bridge Street area downstream.	1	Y
Newbridge Bypass 1.	This is a severe weather culvert. The surface water flood map shows flooding to A472, also reported incidents of highway flooding.	1/2	Y

Table 35: Important Culverts - Newbridge

Groundwater – Where it has been classified, the majority of Newbridge is shown to have low susceptibility to groundwater flooding, based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. No high risk areas were identified in Newbridge. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Ebbw for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Newbridge relate to surface water flooding where the local drainage system is not effective in capturing runoff, or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The Bridge Street area is also shown at risk from the River Ebbw (main river) in large flood events. Table 36 summarises the impacts of flooding in Newbridge, based on the surface water flood map. Figure 25 shows the Flood Risk Map.

COUNTS FOR NEWBRIDGE COMMUNITY AREA				
Risk to People	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	6763	369	92	87
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	2878	41	22	25
Services (n)	26	3	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	420	33	5	11
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	1.6	0.3	0.1	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	11	1	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	390.4	6.3	2.3	5.7

Table 36: Impacts of Flooding in Newbridge - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

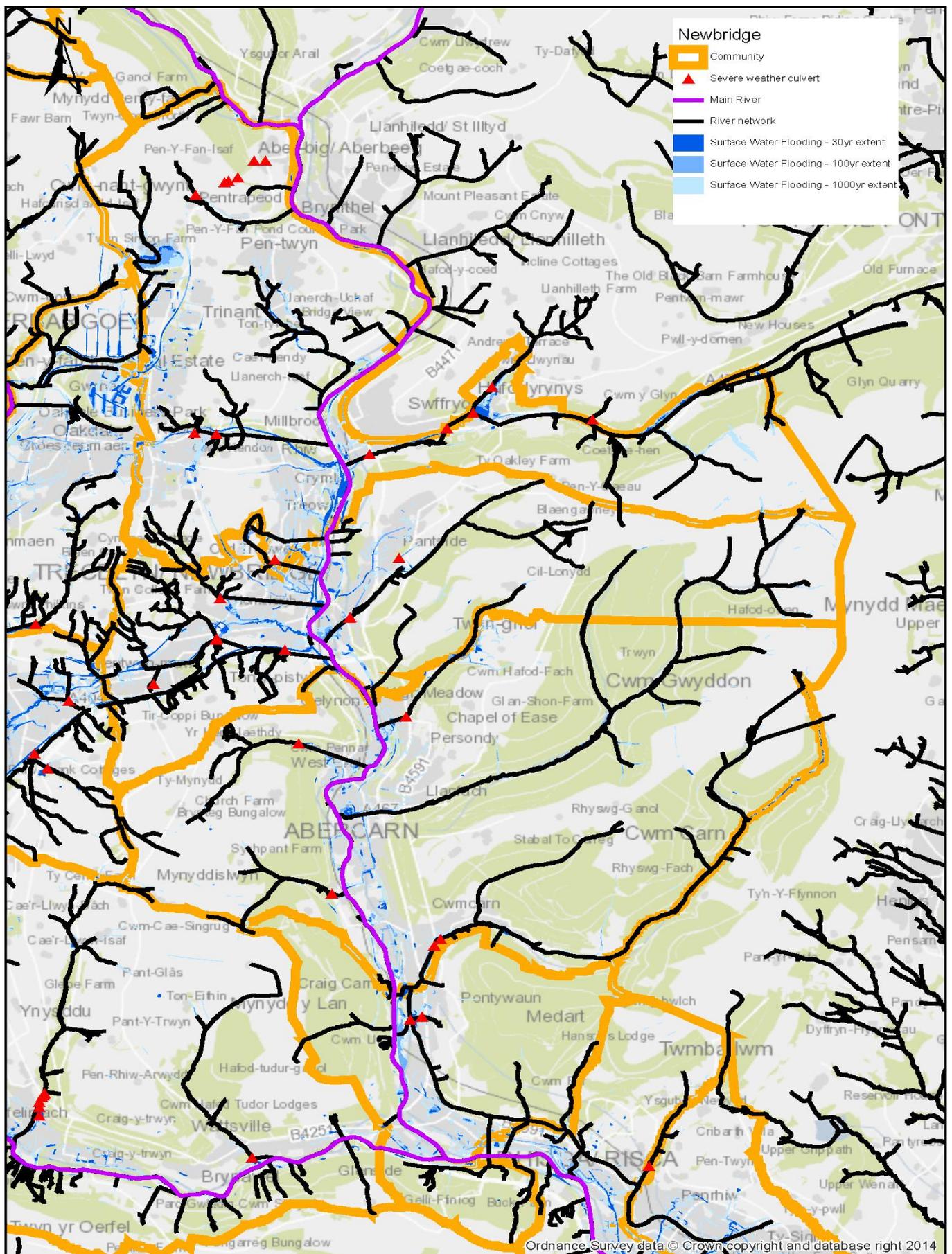


Figure 25: Flood Risk Map for Newbridge

The main flood risks have been identified as follows:***Bridge Street/North Road area:***

This area is generally at high risk of flooding affecting highways and properties. Wider areas are shown to be at medium to low risk. The surface water flood map identifies a number of residential and non-residential properties that are at high risk of flooding and access to properties is likely to be restricted during a flood event. Flooding in this area is likely due to a combination of a blockage or the capacity of the ordinary watercourse culverts and local drainage network which is exacerbated when river levels are high. Further investigations are proposed.

Bryngwyn Road/High Street area:

This area is generally at high risk of flooding affecting highways and properties with more extensive areas shown as medium to low risk on the surface water flood maps. The available information identifies a number of residential properties that are at high risk of flooding and access is likely to be restricted to properties during a flood event. Flooding in this area is most likely due to a combination of a blockage or the capacity of the ordinary watercourse culverts and local drainage network. A culvert replacement is believed to have taken place in 2012. Further investigations are proposed.

Old Pant Road area:

This area is generally at a medium to low risk of flooding affecting highways. The surface water flood maps show relatively few properties at risk of flooding in this area. The flooding is most likely due to blockages or capacity of the local drainage network. There are only a small number of reported flood incidents in this area. No further investigations are proposed at this time however flood incidents will continue to be monitored.

A472:

The area is part shown to be at high risk on the surface water flood maps. The flooding is most likely due to a blockage or the capacity of the local drainage system and ordinary watercourses. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Newbridge.

NEWBRIDGE - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
NB01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
NB02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 35 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
NB03 CCTV survey of priority culverts identified in task NB02. Capacity check of priority culverts identified in task NB02.	0 – 5 (2015–2021)	£3k (< £100k)	M24	CCBC03 CCBC04
NB04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

NEWBRIDGE - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
NB05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
NB06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44	CCBC10
NB07	Use the outcomes from task NB02, NB03, NB05 and NB06 to assess the requirement for and scope of feasibility studies to reduce flooding from ordinary watercourses in Bryngwyn Road area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (< £100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
NB08	Use the outcomes from task NB02, NB03, NB05 and NB06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28

NEWBRIDGE - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
NB09 Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on ordinary watercourses upstream of Bryngwyn Road & the A472.	0 – 2 (2015–2021)	£20k (4 sites, inc installation) (< £100k)	M41 / M42	CCBC25
NB10 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC03
NB11 Assess flood risks to the listed building and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£500 (<£100k)	M23 / M51	CCBC03
NB12 Subject to funding, complete a feasibility study into culvert/intake structure improvements at Homeleigh and Windsor Park (funding bid submitted to Welsh Government).	0 – 5 (2015–2021)	£100k (scheme (<£100k)	M24 / M33	CCBC27 CCBC28

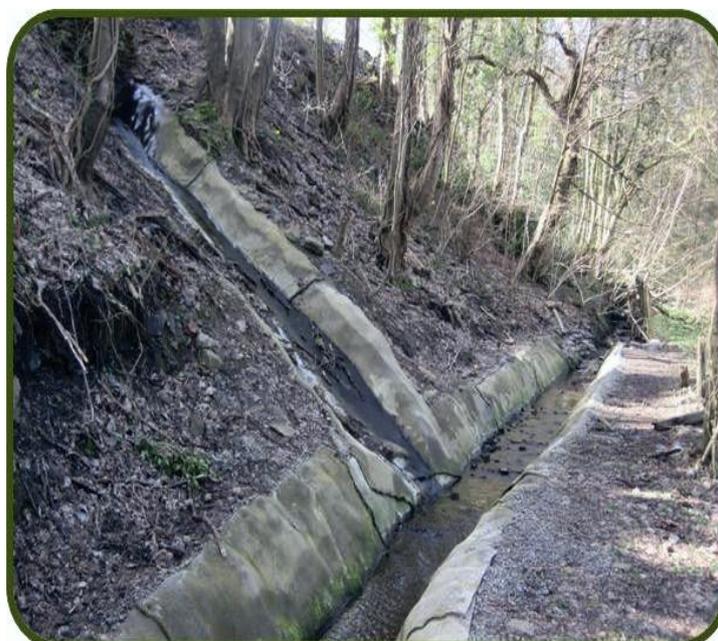
**TOTAL COST OF MEASURES FOR
NEWBRIDGE COMMUNITY AREA:**

£197,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 8
7 Preparing	3 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**CONCRETE CANVAS DITCHES
IN NEWBRIDGE**

6.18. Pengam Community Area

Overview:

The Pengam community is situated towards the centre of the Caerphilly County Borough Council area and includes the town of Pengam. It covers an area of approximately 2.3km², which is largely developed with some open fields, farmland and woodland in the north and south. Much of the existing development is residential although an industrial estate is located in the centre of the community and part of Hawtin Park Industrial Estate is located in the south. Neighbouring communities are Cefn Fforest, Blackwood, Pontllanfraith, Maescywmer, Hengoed, Tir-y-berth and Bargoed.

The River Rhymney forms the western boundary of Pengam. There are a number of ordinary watercourses flowing in a westerly direction towards the River Rhymney. The River Rhymney is designated as a main river and is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to local watercourses and the River Rhymney.

Sources of flooding:

The available information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, and flooding from ordinary watercourses is the main source of flooding affecting Pengam. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area. Flooding from main rivers is less extensive and is mainly limited to undeveloped land to the west of Pengam.

Available data:

The following flood risk information is currently available for Pengam:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).
- Feasibility Study relating to culvert improvements and scheme drawings (2006).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban area of Pengam, with the main areas affected in the vicinity of Commercial Street, Pengam Road, Plas Road and the Industrial Estate to the south. The majority of the areas shown are at low risk however areas shown at medium to high risk are reasonably extensive. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of ordinary watercourses are shown at risk of flooding, particularly near Commercial Street and Gellihaf Road. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 37 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Pengam Road.	The surface water flood map is clear but a report of surcharged culvert received.	2/3	Y
Pengam Road 2, nr substation.	The surface water flood map suggests surcharge could flood Pengam Road.	2	Y
River Terrace.	The surface water flood map indicates this as a high risk flood area. Report of a blocked culvert.	3	Y)
Woodland Place.	The surface water flood map shows extensive flooding along watercourse. Incidents recorded in the vicinity.	3	Y
Fair View.	The surface water flood map shows extensive flooding along watercourse. Incidents recorded in the vicinity.	1	Y
Fair View 2.	The surface water flood map shows extensive flooding along watercourse. Incidents recorded in the vicinity.	1	Y
The Rise.	The surface water flood map shows extensive flooding along watercourse. Incidents recorded in the vicinity.	1	Y
Aneurin Avenue.	The surface water flood map indicates overflow may affect Pengam Rd and properties downstream. Reported incidents in the vicinity.	2	N
Nr Warne Street.	The surface water flood map indicates reasonably extensive overland flow path. Blockage incidents reported.	2	Y

Location	Comment	CCTV required (priority)	Capacity check required
Victoria Road.	Blockage incidents reported. The surface water flood map shows a low risk overland flow path.	2	Y
Gellihaf Road.	This is a severe weather culvert. The surface water flood map shows high risk affecting road.	3	Y
Bont Close, Pengam.	This is a severe weather culvert. The surface water map shows quite extensive affecting properties. The culvert inlet (trash screen) was upgraded ~2006.	2	N

Table 37: Important Culverts - Pengam

Groundwater – The majority of Pengam is shown to have low susceptibility to groundwater flooding based on the underlying geology (or is unclassified). There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A number of low risk areas were identified in Pengam. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. Land immediately adjacent to the River Rhymney is shown at risk of main river flooding. The majority of areas at risk are undeveloped with only a small number of developed areas shown to be at risk. There are no defences present in this community.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Pengam relate to surface water flooding, where the local drainage system is not effective in capturing runoff, or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The western fringe of Pengam is shown at risk from the River Rhymney (main river) in larger flood events although the majority of the areas at risk are undeveloped. Table 38 summarises the impacts of flooding in Pengam, based on the surface water flood map. Figure 26 shows the Flood Risk Map.

COUNTS FOR PENGAM COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3760	270	71	28
<u>Residential Properties at risk of internal flooding</u>				
Residential Properties (n)	1600	36	3	6
Services (n)	19	0	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	342	32	12	9
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	1	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	38.6	2.9	0.8	2.3

Table 38: Impacts of Flooding in Pengam - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

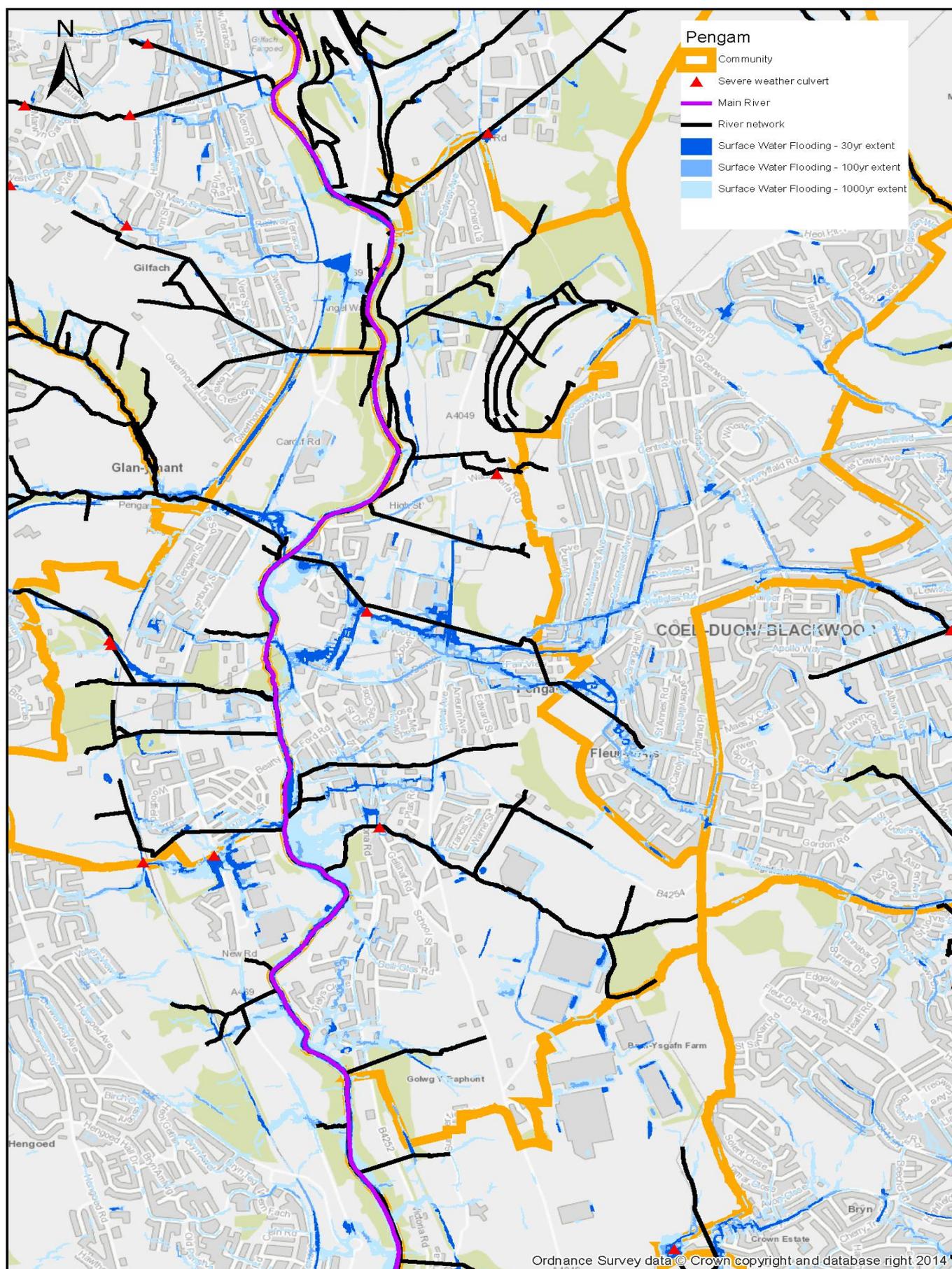


Figure 26: Flood Risk Map for Pengam

The main flood risks have been identified as follows:***Commercial Street/Woodland Place/Fair View area:***

This area is generally at a medium to high risk of flooding with more extensive areas shown at low risk. Flooding in these areas is most likely due to a blockage or the capacity of the ordinary watercourse culvert and local drainage system. Parts of the Industrial Estate are within a high to medium risk area. This area is also shown at risk of flooding from the River Rhymney although it is mainly undeveloped lands adjacent to the river at risk. Some properties are shown to be at high risk of flooding. Further investigations are proposed. A culvert upgrade was completed in 2006 with remedial works carried out to the two headwalls adjacent to Woodland Place and a new headwall constructed upstream. This may have reduced the flood risk from this watercourse.

Plas Road/Pengam Road/Hawtin Park Industrial Estate area:

This area is predominantly at a low to medium risk of flooding although some areas are shown as high risk. This is likely due to a blockage or the capacity of the ordinary watercourse culverts and local drainage systems. Some properties are shown at high risk on the surface water flood maps. The reported flood incidents in this area indicate the flooding may be exacerbated by blocked gullies, sewers and culverts on the ordinary watercourses. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Pengam.

PENGAM - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
PG01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
PG02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 37 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
PG03 CCTV survey of priority culverts identified in task PG02. Capacity check of priority culverts identified in task PG02.	0 – 5 (2015–2021)	£2k (< £100k)	M24	CCBC03 CCBC04

PENGAM - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
PG04	Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
PG05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
PG06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
PG07	Use the outcomes from task PG02, PG03, PG05 and PG06 to assess the requirement for and scope of studies to reduce flooding from local watercourses and drainage systems in the urban area noted above. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£35k (2 sites) (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
PG08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
PENGAM COMMUNITY AREA:**

£50,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



HEADWALL STRUCTURE IN PENGAM

6.19. Penmaen Community Area

Overview:

The Penmaen community is situated towards the centre of the Caerphilly County Borough Council area and covers an area of approximately 4.8 km². The centre and south western boundary of Penmaen is largely developed with open fields and agricultural land present in the remaining areas. The existing development is mainly residential with some areas of commercial/industrial development and other services. Neighbouring communities are Argoed, Crumlin, Newbridge, Pontllanfraith and Blackwood.

The River Sirhowy forms the western boundary of Penmaen with the majority of the area draining to the Sirhowy. The south eastern part of Penmaen drains to the Nant Philkins which flows in a southerly direction before joining the River Sirhowy in the south west of Penmaen. The Nant Gwrhay forms the northern boundary of Penmaen but generally drains land to the north of this community. There are a number of other un-named watercourses which flow through Penmaen before discharging to the River Sirhowy. The River Sirhowy is designated main river and therefore is the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Sirhowy.

Sources of flooding:

The Natural Resources Wales Flood Map indicates flooding from the River Sirhowy (main river) affects the lower lying land adjacent to the river, with undeveloped land and a small number of properties affected. The available information indicates flooding from ordinary watercourses is not particularly extensive and mainly affects undeveloped lands with some urban areas in the south west of Penmaen potentially affected. Problems may occur in more isolated locations, for example due to culvert restrictions. Surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of areas in the community. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Penmaen:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the developed areas of Penmaen. Much of this is concentrated around the confluence of the Nant Philkins and River Sirhowy in the south west, however wider areas are shown at risk. The main areas affected are in the vicinity of Woodfield Terrace, Groveside Road, the B4251 and the commercial premises near Yard Coal Rise. Several of these areas are shown at high risk of flooding with larger areas at low to medium risk. The number of properties shown at risk is reasonably low however some commercial/industrial properties in the north of Penmaen are potentially shown at high risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains as the cause of flooding.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly at Woodfield Park Crescent. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 39 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Nant Gwrhay, Cwm Road/Waterloo.	Incidents reported relate to a blockage.	3	N
Dafydd Hill.	Some reported incidents in the vicinity. The surface water flood map shows possible consequences from backing up.	3	N
Dafydd Hill 2.	Some reported incidents in the vicinity. The surface water flood map shows possible consequences from backing up.	3	N
Oakdale Terrace/Groveside Road area.	There have been several flooding incidents reported. The surface water flood map shows quite extensive flooding. The reported flooding may possibly be due to blocked or inadequate drainage. General check of drainage adequacy/maintenance.	3	Y
Oakdale Terrace.	Some incidents reported. The surface water flood map shows reasonable flow path. Also check channel size upstream.	3	Y
Yard Coal Rise.	Incidents reported of a blocked culvert.	3	N

Location	Comment	CCTV required (priority)	Capacity check required
St David's Avenue.	Incidents reported of a blocked culvert	3	N
Oakdale Terrace 2.	The surface water flood map shows reasonably extensive flooding in the vicinity. Reported incidents of blockages and property flooding.	1/2	Y
Penmaen Road, Woodfieldside, (Tir Philkins 2).	This is a severe weather culvert. The surface water flood map shows quite extensive flooding in the vicinity. Reports incidents of blockages and property flooding.	1	Y
Tir Philkins.	This is a severe weather culvert. The surface water flood map shows quite extensive flooding in the vicinity.	1	Y
Cwm Philkins.	Incidents reported of a blockage. Property flooding.	2	Y

Table 39: Important Culverts - Penmaen

Groundwater – Where it has been classified, Penmaen is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Several low risk areas were identified in Penmaen. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Sirhowy for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. Land immediately adjacent to the River Sirhowy is shown at risk of main river flooding.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Penmaen relate to surface water flooding where the local drainage system is not effective in capturing runoff, or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Part of Penmaen is shown at risk from the River Sirhowy (main river). Table 40 summarises the impacts of flooding in Penmaen based on the surface water flood map. Figure 27 shows the Flood Risk Map.

COUNTS FOR PENMAEN COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0,0m</u>				
People (n) (multiplier 2.35)	5196	183	49	12
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	2211	13	14	1
Services (n)	14	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	286	15	6	3
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	9	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	61.2	4.5	1.2	3.1

Table 40: Impacts of Flooding in Penmaen – Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

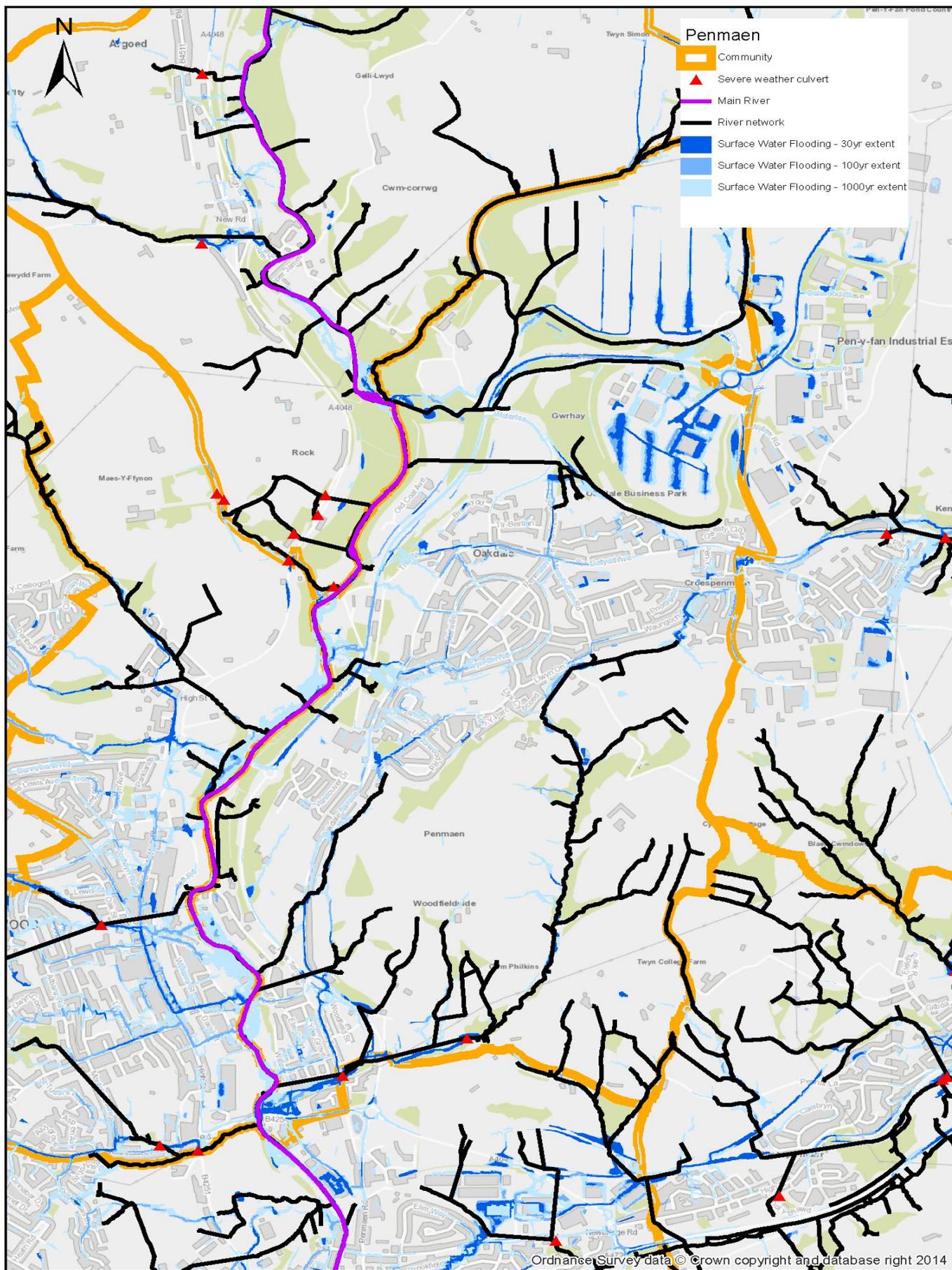


Figure 27: Flood Risk Map for Penmaen

The main flood risks have been identified as follows:***Woodfield Terrace area:***

This area is generally at a high risk of flooding which is most likely due to a blockage or the capacity of the ordinary watercourse and local drainage system. Some properties are potentially at risk, particularly during larger flood events. A number of the reported flood incidents in this area refer to ordinary watercourse flooding. Further investigations are proposed.

Groveside Road/Central Avenue area:

This area is generally at a medium to low risk of flooding affecting highways and potentially a number of properties. The surface water flood maps indicate some highways are at high risk. Flooding in this area is likely due to a blockage or the capacity of the local drainage system and many of the reported flood incidents refer to blocked gullies and sewers. Further investigations are proposed.

Yard Coal Rise area:

This area is generally at a high risk of flooding affecting highways and a number of commercial/industrial properties. More extensive areas are at medium to low risk. Flooding in this area is likely due to a blockage or the capacity of the local drainage system, however there are no reported flood incidents in this area. Further investigations are proposed.

B4251:

This area is at a high to medium risk of flooding affecting the highway. This is most likely due to a blockage or restricted capacity of the ordinary watercourse culverts and local drainage network. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Penmaen.

PENMAEN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
PM01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
PM02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 39 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
PM03 CCTV survey of priority culverts identified in task PM02. Capacity check of priority culverts identified in task PM02.	0 – 5 (2015–2021)	£3k (< £100k)	M24	CCBC03 CCBC04

PENMAEN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
PM04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (all CCBC) (< £100k)	N/A	CCBC03
PM05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
PM06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
PM07 Use the outcomes from task PM02, PM03, PM05 and PM06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourses near Woodfield Terrace and the B4251. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (2 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28

PENMAEN - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
PM08	Use the outcomes from task PM02, PM03, PM05 and PM06 to assess the requirement for and scope of studies to reduce flooding from surface water and local drainage systems. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£35k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
PM09	Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on ordinary watercourses.	0 – 2 (2015–2021)	£25k (5 sites, inc installation) (< £100k)	M41 / M42	CCBC25
PM10	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
PM11	Assess flood risks to the listed buildings at high risk and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£500 (< £100k)	M23	CCBC03

**TOTAL COST OF MEASURES FOR
PENMAEN COMMUNITY AREA:**

£117,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 7
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



INTAKE STRUCTURE IN PENMAEN

6.20. Pontllanfraith Community Area

Overview:

The Pontllanfraith community is situated towards the centre of the Caerphilly County Borough Council area and covers an area of approximately 5.8 km². The community is largely developed, including the urban areas of Pontllanfraith and Blackwood. The existing development is mainly residential with some areas of commercial/industrial development and other services. Neighbouring communities are Blackwood, Penmaen, Newbridge, Abercarn, Ynysddu, Maesycwmmmer and Pengam.

The River Sirhowy flows north to south through the community with the majority of the area draining via un-named watercourses to the Sirhowy. The Nant Brynar flows through the north eastern corner of the community, draining some of the land towards the adjacent Newbridge community. The River Sirhowy is designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Sirhowy.

Sources of flooding:

The Natural Resources Wales Flood Map indicates flooding from the River Sirhowy (main river) affects lower lying land adjacent to the river, mainly affecting industrial and commercial properties adjacent to the river. The available data indicates flooding from the un-named watercourses and surface water flooding from drainage systems potentially affects properties and highways in the urban area. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Pontllanfraith:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the developed areas of Pontllanfraith. Much of this is concentrated around ordinary watercourses however wider areas are shown at risk. The main areas affected are around Bryn Lane, Manor Road/A4048, Penmaen Road, the A472 and Meadow Road/Newbridge Road. Several of these areas are shown at high risk of flooding with a larger area at low to medium risk. A comparatively high number of properties are also shown at risk, particularly non-residential properties. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly the Meadow Road/Newbridge Road area, Bryn Lane, and A472. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 41 shows important culverts that have been identified from the 'At Risk Culvert Register' and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Crown Lane, Pontllanfraith in garden of 'Ty-Nant'.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map.	3	N
Crown Lane.	Significant flow path downstream shown on the surface water flood map.	2	Y
Dan-y-Bryn, Pontllanfraith.	This is a severe weather culvert. Reasonable flow path downstream is shown on the surface water flood map.	3	N
Nant -y – Rhos, Pontllanfraith.	This is a severe weather culvert. Reasonable flow path downstream is shown on the surface water flood map.	3	N
Gelli Lane, Pontllanfraith.	This is a severe weather culvert. Reasonable flow path downstream is shown on the surface water flood map.	3	N
Gelligroes Access Mill.	This is a severe weather culvert. Reasonable flow path downstream is shown on the surface water flood map.	3	N
Gelligroes, Mill Road, Pontllanfraith.	This is a severe weather culvert. Reasonable flow path downstream is shown on the surface water flood map.	2	N
Heolddu Road 1.	This is a severe weather culvert. Flooding shown and reported blockage incidents.	2	Y
Heolddu Road 2, Wyllie.	This is a severe weather culvert. Flooding shown and reported blockage incidents.	2	Y

Location	Comment	CCTV required (priority)	Capacity check required
Newport Road, Ynysddu, Pontgam by lighting column (IJ 171).	This is a severe weather culvert.	3	N
Gelli Lane, Pontllanfraith.	Backing up shown on the surface water flood map. Incidents reported.	3	Y
A472, nr quarry.	Significant flooding shown to A472. Incidents reported in the vicinity.	2	Y
Meadow Road.	Blockage incidents reported. Reasonable flooding is shown on the surface water flood map.	2	N
Newbridge Road.	There is reasonable flooding shown on the surface water flood map. Some incidents reported.	1	Y
Bypass near Factory.	There is reasonable flooding shown on the surface water flood map. Some incidents reported.	1	Y
Factory nr dismantled railway.	Flooding is shown on the surface water flood map.	1	Y

Table 41: Important Culverts - Pontllanfraith

Groundwater – Where it has been classified, Pontllanfraith is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A high risk area and several medium to low risk areas were identified in Pontllanfraith Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Sirhowy for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. Land immediately adjacent to the River Sirhowy is shown at risk of main river flooding.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risk in Pontllanfraith relate to surface water flooding where the local drainage system is not effective in capturing runoff, or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Part of Pontllanfraith is shown at risk from the River Sirhowy (main river). Table 42 summarises the impacts of flooding in Pontllanfraith based on the surface water flood map. Figure 28 shows the Flood Risk Map.

COUNTS FOR PONTLLANFRAITH COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	8608	313	61	61
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	3363	39	11	14
Services (n)	43	2	0	1
Risk to Economic Activity				
Non-Residential Properties (n)	578	43	31	17
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	5	2	1	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	12.1	0.1	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.6	0	0	0
Listed Buildings (n)	23	0	0	1
Licensed Abstractions (LA) (n)	2	2	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	53.7	3.5	0.9	3.2

Table 42: Impacts of Flooding in Pontllanfraith - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

The main flood risks have been identified as follows:***Bryn Lane area:***

This area is at a high risk of flooding which is likely due to a blockage or the capacity of the ordinary watercourse culverts and local drainage system. Some properties are potentially at risk of flooding, particularly during larger flood events. Further investigations are proposed.

Manor Road/A4048 area including the works adjacent to the Sirhowy:

This area is at generally a low to medium risk of flooding. This is likely due to a blockage or the capacity of the local drainage system which is exacerbated when river levels are high. Part of this area is also shown at risk of flooding from the River Sirhowy where some properties are potentially at risk of flooding during larger flood events. Further investigations are proposed.

Penmaen Road area:

This area is at a high risk of flooding potentially affecting properties. This is likely due to a blockage or the capacity of the local drainage system. No reported flood incidents have occurred and it is likely the local drainage system is not well represented in the surface water model. Therefore, the flood risk may be less than indicated. No further investigations are proposed at this time.

Meadow Road/Newbridge Road area:

Some parts of this area are at high risk of flooding. This is likely due to a blockage or the capacity of the ordinary watercourse culverts, which are exacerbated when river levels are high. Several residential and non-residential properties are potentially at risk of flooding. Further investigations are proposed.

A472:

This area is at a high risk of flooding affecting the highway. This is likely due to a blockage or restricted capacity of the ordinary watercourse culverts. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Pontllanfraith.

PONTLLANFRAITH - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
PF01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
PF02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 41 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
PF03 CCTV survey of priority culverts identified in task PF02. Capacity check of priority culverts identified in task PF02.	0 – 5 (2015–2021)	£3k (< £100k)	M24	CCBC03 CCBC04

PONTLLANFRAITH - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
PF04	Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
PF05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
PF06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC10
PF07	Use the outcomes from task PF02, PF03, PF05 and PF06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourses. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£75k (3 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
PF08	Use the outcomes from task PF02, PF03, PF05 and PF06 to assess the requirement for and scope of studies to reduce flooding from surface water and local drainage systems. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£35k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28

PONTLLANFRAITH - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
PF09 Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on un-named watercourses	0 – 2 (2015–2021)	£25k (~5 sites) (< £100k)	M41 / M42	CCBC25
PF10 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm)	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC03
PF11 Assess flood risks to the listed buildings at high risk and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£500 (< £100k)	M23	CCBC03

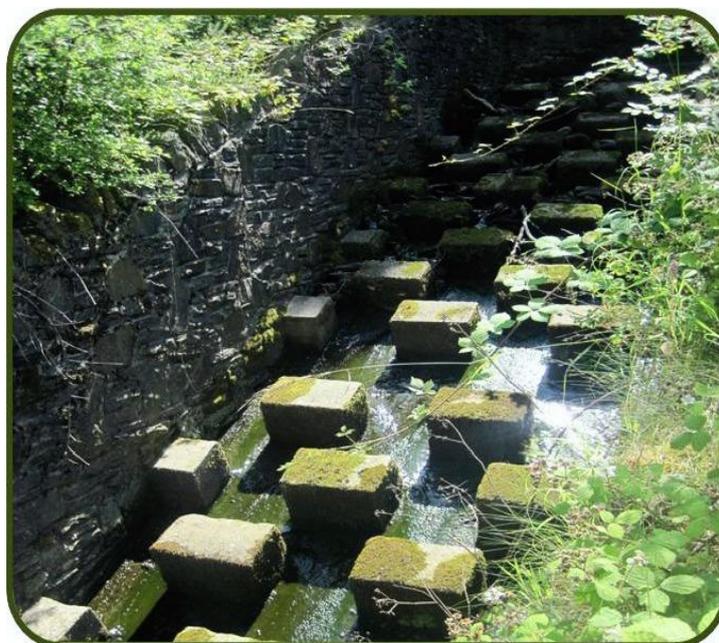
**TOTAL COST OF MEASURES FOR
PONTLLANFRAITH COMMUNITY AREA:**

£152,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 7
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**DRAGON TEETH CASCADE
IN PONTLLANFRAITH**

6.21. Pontymister East Community Area

Overview:

Pontymister East is situated in the east of the Caerphilly County Borough Council area and includes the eastern part of Risca. It covers an area of approximately 2.7 km² which is largely developed in the south and consists of open fields and farmland in the north. The majority of the development in the area is residential and there are likely to be a number of small businesses, commercial properties and other non-residential properties and services. The neighbouring community is Pontymister West. Pontymister East also borders the neighbouring local authorities of Torfaen County Borough Council and Newport City Council.

The railway line forms the south western boundary of Pontymister East with the majority of the area draining via unnamed watercourses to the west towards the River Ebbw located in the adjacent Pontymister West community. These watercourses are culverted where they flow through the urban areas and may cross the Monmouthshire & Brecon canal although it is not known if there is any hydraulic connection. The north eastern fringe of Pontymister East drains via an unnamed watercourse to the Pant-yr-eos reservoir to the east. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the Ebbw.

Sources of flooding:

The main source of flooding in Pontymister East is surface water flooding, where the drainage system cannot cope with high intensity rainfall events. The surface water flood maps indicate that highways and properties across the urban area are potentially at risk. Flooding from ordinary watercourses is less extensive although problems may occur in more isolated locations, for example due to culvert restrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Pontymister East:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding mainly affecting highways and properties in the developed areas of Manor Road and Gelli Avenue. These areas are generally shown at high to medium risk with wider areas at low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies but incidents suggest the capacity of the drainage network may be insufficient to cope with all storms.

Ordinary Watercourses – The available information indicates that flooding from ordinary watercourses is not particularly extensive. The flooding shown at and around Manor Road may be attributed to the ordinary watercourse that is culverted through this area. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 43 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Fernlea.	This is a severe weather culvert. The surface water floodmap shows limited flooding in the vicinity. No incidents reported.	2/3	Y
Eppynt Close.	The surface water flood map indicates risk of flooding from culvert overflows.	2	Y
Manor Road.	The surface water flood map indicates some potential for flooding in the vicinity.	2	Y

Table 43: Important Culverts – Pontymister East

Groundwater – Where it has been classified, part of Pontymister East has been shown to have some susceptibility to groundwater flooding, based on the underlying geology. The east of the area is shown to have low susceptibility while the west has medium susceptibility. The southern extent of the area is shown to have high susceptibility. However no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – A number of areas at low risk of sewer flooding were identified in Pontymister East in the Preliminary Flood Risk Assessment, based on the DG5 incidents register. No high or medium risk areas were identified. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is unlikely to be any interaction between the ordinary watercourses and drainage networks in Pontymister East given the distance to the nearest main river.

Monmouthshire & Brecon Canal – This is a potential source of flooding to Pontymister East, however there are no known reports of flooding directly from the canal. Detailed information relating to the operation, flows and condition of the canal are not currently available. Similarly there is limited information on any connections between the ordinary watercourses and the canal. This will require more detailed investigations.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Pontymister East relate to surface water flooding. Ordinary watercourse flooding is less extensive, however it may affect specific areas, particularly where culverts may be blocked or have restricted capacity. The reported flood incidents indicate that surface water flooding is often due to (or exacerbated) by blocked gullies or storm sewers. Table 44 summarises the impacts of flooding in Pontymister East, based on the surface water flood map. Figure 29 shows the Flood Risk Map for Pontymister East.

COUNTS FOR PONTYMISTER EAST COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	6557	216	12	9
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	2790	19	0	0
Services (n)	15	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	200	13	1	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	1.6	0.1	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	29.7	0.7	0.1	0.2
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	6	0	1	2
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	32.7	1.0	0.9	1.1

Table 44: Impacts of Flooding in Pontymister East - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

The main flood risks have been identified as follows:***Manor Road area:***

This area is generally at a high to medium risk of flooding affecting highways and potentially residential properties in larger events, with wider areas shown at low risk on the surface water flood maps. Flooding in this area is likely due to blockages or the capacity of the ordinary watercourse culverts and local drainage network and many of the reported flood incidents relate to blocked gullies and storm drains. Further investigations are proposed.

Gelli Avenue area:

This area is generally at a high to medium risk of flooding affecting highways and potentially a small number of residential properties in larger events. Flooding in this area is most likely due to blockages or the capacity of the local drainage network and many of the reported flood incidents relate to blocked gullies and storm drains. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Pontymister East.

PONTYMISTER EAST - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
PE01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
PE02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 43 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
PE03 CCTV survey of priority culverts identified in task PE02. Capacity check of priority culverts identified in task PE02.	0 – 5 (2015–2021)	£1k (< £100k)	M24	CCBC03 CCBC04
PE04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
PE05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

PONTYMISTER EAST - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
PE06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5 (< £100k)	M24 / M44 / M53	CCBC10
PE07 Use the outcomes from task PE02, PE03, PE05 and PE06 to assess the requirement for and scope of studies to reduce flooding from surface water and local drainage systems and ordinary watercourses. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
PE08 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5 (< £100k)	M23	CCBC25
PE09 Assess flood risks to the listed buildings and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£1.5k (< £100k)	M23	CCBC03

**TOTAL COST OF MEASURES FOR
PONTYMISTER EAST COMMUNITY AREA:**

£56,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



WATER FEATURE IN PONTYMISTER EAST

6.22. Pontymister West Community Area

Overview:

Pontymister West is situated in the east of the Caerphilly County Borough Council area and includes the western part of Risca town. It covers an area of approximately 5.1 km² which is largely rural consisting of open fields and agricultural land in the north and south while Risca occupies the central part of the community. The majority of the development in the area is residential although there is an industrial estate adjacent to the River Ebbw in the south of the community and there are likely to be a number of small businesses, commercial properties and other non-residential properties and services. The neighbouring communities are Pontymister East, Machen and Crosskeys. Pontymister West also borders the neighbouring local authority of Newport City Council.

The River Ebbw flows in a south easterly direction through the centre of Pontymister West. The majority of the area drains towards the River Ebbw via a number of ordinary watercourses and field drains. These watercourses are culverted where they flow through urban areas and the watercourses in the northern part of the community may cross the Monmouthshire & Brecon canal although it is not known if there is any hydraulic connection. The northern fringe of Pontymister West drains to the Nant Carn outside the boundary of the community. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the River Ebbw.

Sources of flooding:

The main source of flooding in Pontymister West is main river flooding. The Natural Resources Wales Flood Maps indicate significant areas of the community are at risk of flooding from the River Ebbw during larger events. A large number of properties, both residential and industrial, are shown to be at risk although flood defences are present to reduce this risk. A significant number of highways are also shown to be affected in the surface water flood maps. A small number of properties are also shown to be at risk from surface water flooding. Flooding from ordinary watercourses is less extensive although problems may occur in more isolated locations, for example due to culvert restrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Pontymister West:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding mainly affecting highways with some properties potentially at risk. The main areas affected are St. Mary Street, Commercial Street and Newport Road. These areas are generally shown at high to medium risk with wider areas at low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies and storm sewers.

Ordinary Watercourses – The available information indicates that flooding from ordinary watercourses is not particularly extensive. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. The surface water flood maps show similar areas potentially at risk where ordinary watercourses are culverted through the town. Table 45 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Near cemetery.	Long culvert. The surface water flood map indicates limited flooding.	3	N
Nant y Carn.	The surface water flood map shows some flooding in the vicinity, but not too extensive.	2	N
Malvern Terrace.	The surface water flood map shows extensive flooding in the vicinity. There have been several reported incidents of flooding due to blocked drainage.	1/2	N
Clyde Street.	The surface water flood map shows quite extensive flooding in the vicinity. There have been reported incidents of flooding due to blocked drainage.	1/3	N
Crescent Road.	The surface water flood map shows reasonably extensive flooding in the vicinity. There have been reported incidents of flooding due to blockages.	2	Y
A467 Risca Roundabout near Ocherwyth Junction.	This is a severe weather culvert. The surface water flood map shows that flooding in the vicinity is not very extensive. Potential for impact on A467 & Pontymister Industrial estate.	2/3	N
Lower Ocherwyth Road.	This is a severe weather culvert. The surface water flood map shows that flooding in the vicinity is not very extensive. Potential for impact on A467 & Pontymister Industrial Estate.	2/3	N
Ty Isaf Playing Fields.	This is a severe weather culvert. The surface water flood map shows that flooding in the vicinity is not very extensive.	3	N
Newport Road.	The surface water flood map shows reasonably extensive flooding in the vicinity.	3	N
Near electricity substation.	The surface water flood map shows reasonably extensive flooding in the vicinity.	2/3	N

Table 45: Important Culverts – Pontymister West

Groundwater – Where it has been classified, Pontymister West has been shown to be susceptible to groundwater flooding, based on the underlying geology. The north of the area is shown to have low susceptibility while the centre has medium susceptibility. The southern extent of the area is shown to have high susceptibility. However no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – An area at low risk of sewer flooding was identified in Pontymister West in the Preliminary Flood Risk Assessment, based on the DG5 incidents register. No high or medium risk areas were identified. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Ebbw for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Monmouthshire & Brecon Canal – This is a potential source of flooding to Pontymister West however there are no known reports of flooding directly from the canal. Detailed information relating to the operation, flows and condition of the canal are not currently available. Similarly there is limited information on any connections between the ordinary watercourses and the canal. This will require more detailed investigations.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Pontymister West relate to main river flooding. Significant areas are also shown to be at risk of surface water flooding and/or ordinary watercourse flooding and the reported flood incidents indicate that surface water flooding is often due to (or exacerbated by) blocked gullies or storm sewers. Table 46 summarises the impacts of flooding in Pontymister West, based on the surface water flood map. Figure 30 shows the Flood Risk Map for Pontymister West.

COUNTS FOR PONTYMISTER WEST COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	5732	677	82	75
<u>Residential Properties at risk of internal flooding >0.2m</u>				
Residential Properties (n)	2439	143	24	22
Services (n)	33	5	0	1
Risk to Economic Activity				
Non-Residential Properties (n)	588	102	27	16
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	2.2	0.2	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	20.2	1.6	0.4	0.3
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	3	1	0	1
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	2.9	0	0	0
Parks and Gardens (ha)	3.4	0	0	0
Scheduled Ancient Monuments (ha)	6.3	0.1	0	0
Listed Buildings (n)	14	1	0	2
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	135	2.6	1.6	5.9

Table 46: Impacts of Flooding in Pontymister West - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

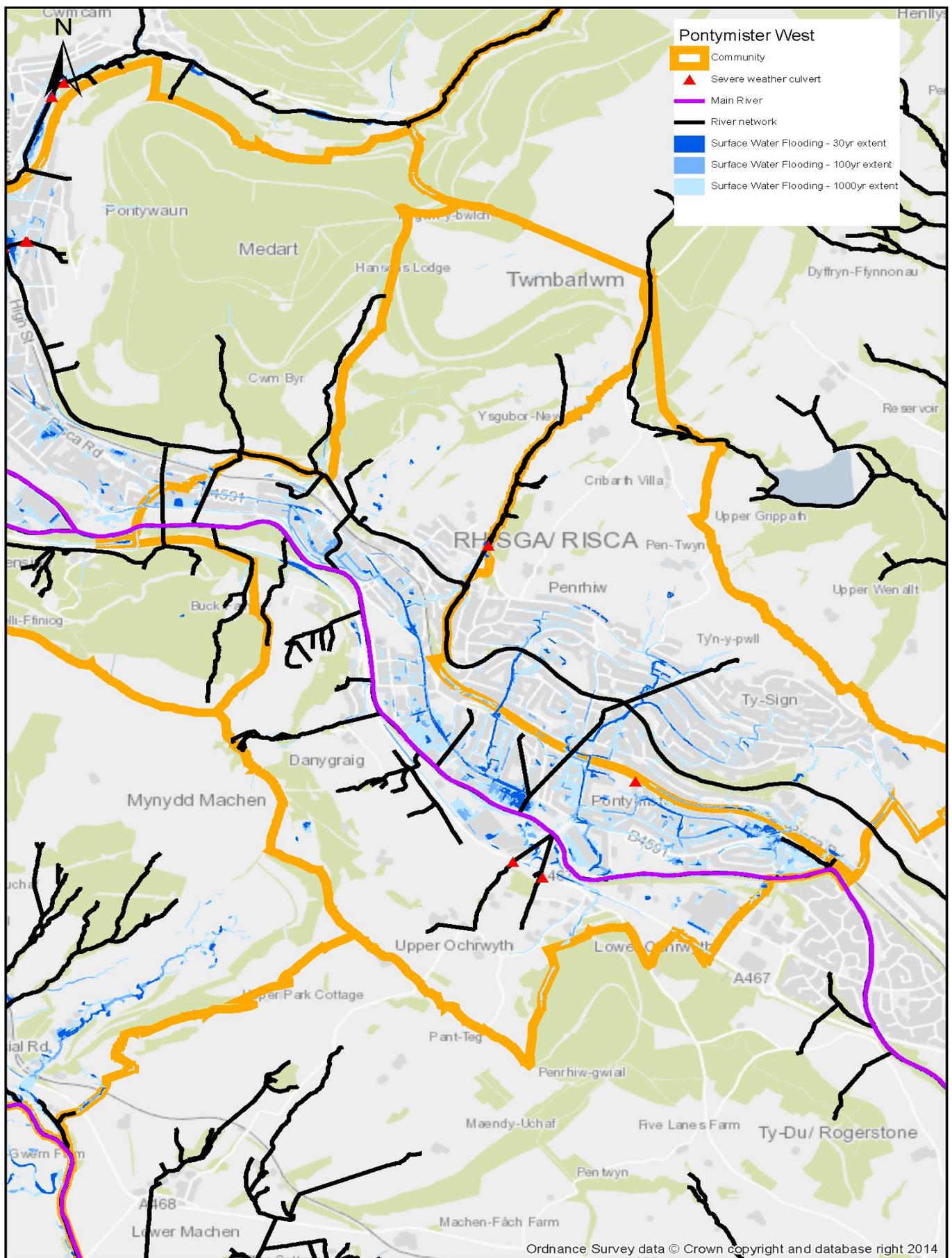


Figure 30: Flood Risk Map for Pontymister West

The main flood risks have been identified as follows:***St. Mary Street area:***

This area is generally at a high to medium risk of flooding affecting highways and potentially properties shown to be at low risk within more extensive areas. Flooding in this area is likely due to a blockage or the capacity of the local drainage network and ordinary watercourse culverts and many of the reported flood incidents refer to blocked gullies and storm drains. This area is also shown to be at risk from main river flooding with extensive areas at risk including a significant number of properties, although flood defences are present to reduce this risk. Further investigations are proposed.

Commercial Street area:

This area is generally at a high to medium risk of flooding affecting highways, and potentially properties shown to be at low risk within more extensive areas. Areas of Pontymister Industrial Estate are also shown to be at risk. Flooding in this area is likely to be caused by surface water flooding due to a blockage or the capacity of the local drainage network and ordinary watercourse culverts and many of the reported flood incidents refer to blocked gullies and storm sewers. This area is shown to be at risk of main river flooding on the Natural Resources Wales Flood Maps with a large number of highways and residential and industrial properties at risk. Flood defences are present in Pontymister West to reduce this risk. Further investigations are proposed.

Newport Road area:

This area is predominantly at a high to medium risk of flooding. This is likely due to a combination of a blockage to or the capacity of the local drainage network and ordinary watercourse culverts. Several highways and potentially properties are shown to be at risk and access to properties is likely to be restricted during large flood events. This area is shown on the Natural Resources Wales Flood Maps to be at risk from main river flooding with a significant number of properties affected, although flood defences are present in the area to reduce this risk.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Pontymister West.

PONTYMISTER WEST - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response PW01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans PW02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 45 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
PW03 CCTV survey of priority culverts identified in task PW02. Capacity check of priority culverts identified in task PW02.	0 – 5 (2015–2021)	£3k (< £100k)	M24	CCBC03 CCBC04

PONTYMISTER WEST - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
PW04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
PW05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44 / M53	CCBC20
PW06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44	CCBC10
PW07 Use the outcomes from task PW02, PW03, PW05 and PW06 to assess the requirement for and scope of studies to reduce flooding from surface water, local drainage systems and ordinary watercourses. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£45k (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
PW08 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
PW09 Assess flood risks to the listed buildings and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£1k (<£100k)	M23	CCBC03

**TOTAL COST OF MEASURES FOR
PONTYMISTER WEST COMMUNITY AREA:**

£62,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**INTAKE STRUCTURE AT
PONTYMISTER WEST**

6.23. Trethomas Community Area

Overview:

The Trethomas community is situated towards the south of the Caerphilly County Borough Council area and includes the urban fringe of Caerphilly town. It covers an area of approximately 3.8 km², around one quarter of which is developed with the remainder open fields and farmland. Much of the existing development is residential although there is a large industrial estate (Pant Glas Industrial Estate), adjacent to the River Rhymney. There are also likely to be a number of small businesses and commercial properties, particularly towards the town centre, and other non-residential properties and services. Neighbouring communities are Ynysddu, Machen, Rudry, Caerphilly East and Bedwas.

The Trethomas area generally drains in a southerly direction towards the River Rhymney. The Red Brook forms the eastern boundary and there are a number of un-named watercourses, which either discharge to the Red Brook or directly to the River Rhymney, which forms the southern boundary. The River Rhymney is designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the Red Brook and River Rhymney.

Sources of flooding:

The available data indicates flooding from ordinary watercourses is not particularly extensive, however this has not previously been assessed. Problems may occur in more isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties in the community. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area with significant risks in some areas.

Available data:

The following flood risk information is currently available for Trethomas:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban areas of the ward, with the main areas affected in the vicinity of Pant Glas Industrial Estate, Llanfabon Drive, Grove Estate and Newport Road. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains and not all areas identified as at risk on the surface water flood map have reported incidents.

Ordinary Watercourses – Some areas in the vicinity of ordinary watercourses are shown at risk of flooding, potentially affecting properties particularly in the vicinity of Upper Glyn Gwyn Street and the western end of the Pant Glas Industrial Estate. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 47 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Bedwas Pond.	This is a severe weather culvert. A survey of the Bedwas Pond is required including the outlet structure.	3	N
Navigation Street, Trethomas, within Colliery site.	This is a severe weather culvert. Incidents reported downstream. Some flooding is shown.	1/2	Y
Upper Glyn Gwyn Street, Trethomas.	This is a severe weather culvert. Significant flooding is shown and reported blockage incidents.	1/2	Y
Addison Way, Red Brook.	This is a severe weather culvert. Significant flooding is shown to the road. Blockage incidents reported.	3	Y
A468 Trethomas, Side of BP Garage.	This is a severe weather culvert. Incidents reported in the vicinity but limited flooding is shown.	3	Y

Table 47: Important Culverts - Trethomas

Groundwater – The majority of the southern part of Trethomas is shown to be susceptible to groundwater flooding, based on the underlying geology. There are also several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. No high risk areas were identified in Trethomas. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Trethomas relate to surface water flooding where the local drainage system is not effective in capturing runoff, or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The Pant Glas Industrial Estate is also shown at risk from the River Rhymney (main river) in large flood events. Table 48 summarises the impacts of flooding in Trethomas, based on the surface water flood map. Figure 31 shows the Flood Risk Map.

COUNTS FOR TRETTHOMAS COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	2512	313	40	9
<u>Residential Properties at risk of internal flooding >0.2m</u>				
Residential Properties (n)	1069	50	0	0
Services (n)	19	0	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	204	44	7	16
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	16.1	4.0	1.5	2.3
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	1	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0.1	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	1	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	48.7	3.6	1.5	3.6

Table 48: Impacts of Flooding in Trethomas - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

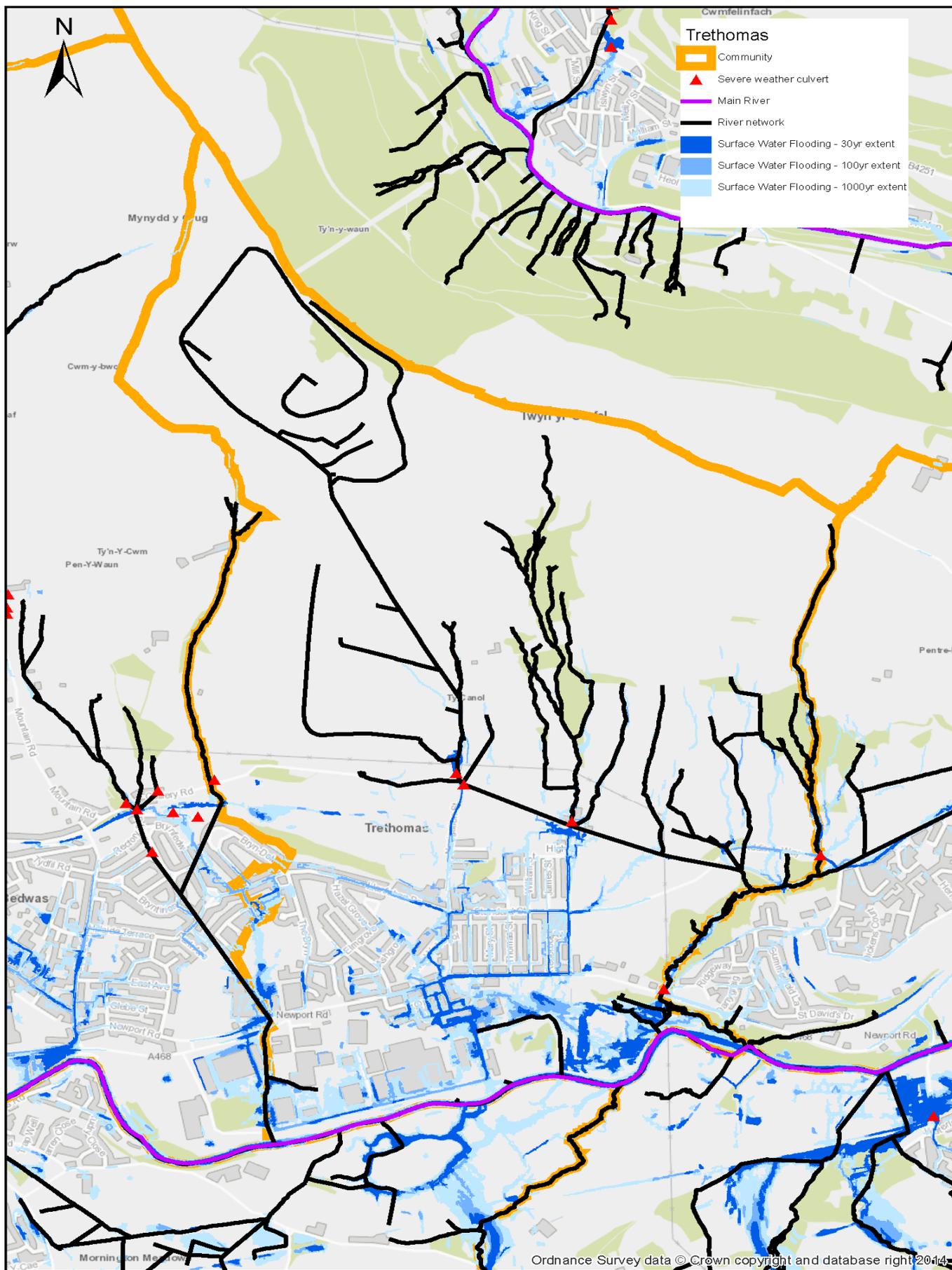


Figure 31: Flood Risk Map for Trethomas

The main flood risks have been identified as follows:***Glyn Gwyn:***

This area is at a high risk of flooding which is more than likely due to the blockage of or the capacity of the culvert. The immediate area is affected by limited flooding, however the surface water flood map indicates flooding could affect highways further south. Flood incident reports refer to blockage of the culvert. Properties are not shown to be at risk except in larger flood events. Further investigations are proposed.

Grove Estate/Llanfabon Drive area:

This area is generally at a medium to low risk of flooding affecting highways. This is likely due to flooding from the local drainage network although it may be exacerbated by overland flows from the ordinary watercourses to the north. Whilst the surface water flood map shows a reasonably extensive area at risk, there are relatively few properties shown at risk except in larger flood events. However reported incidents suggest properties may be at risk. Further investigations are proposed.

Newport Road and area to the south:

This area is generally at a high risk of flooding affecting highways and properties. The surface water flood map indicates that there are several non-residential properties at high risk of flooding and access is likely to be restricted to properties during a flood event. There are several reported flood incidents in the area. This is most likely due to a combination of a blockage or the capacity of the drainage network, exacerbated when river levels are high. Further investigations are proposed.

Pant Glas Industrial Estate:

This area is at a low risk of flooding potentially affecting commercial properties and access. The area is also shown to be at risk of flooding from the River Rhymney during larger events however there are no reported flood incidents. This is likely due to a combination of a blockage or the capacity of the drainage network exacerbated when river levels are high. No further investigations are proposed at the present time, however incident reports will continue to be monitored to assess risks

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Trethomas.

TRETTHOMAS - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
TT01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
TT02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 47 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
TT03 CCTV survey of priority culverts identified in task TT02. Capacity check of priority culverts identified in task TT02.	0 – 5 (2015–2021)	£1.5k (< £100k)	M24	CCBC03 CCBC04
TT04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
TT05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues	Ongoing	£500 (< £100k)	M42 / M44 / M53	CCBC20

TRETHOMAS - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
TT06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44	CCBC10
TT07	Use the outcomes from task TT02, TT03, TT05 and TT06 to assess the requirement for and scope of feasibility studies to reduce flooding from ordinary watercourses at Glyn Gwyn and Navigation Street. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (< £100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
TT08	Use the outcomes from task TT02, TT03, TT05 and TT06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the vicinity of Grove Estate and south of Newport Road. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
TT09	Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on ordinary watercourses at Glyn Gwyn and Navigation Street.	0 – 2 (2015–2021)	£10k (2 sites) (< £100k)	M41 / M42	CCBC25

TRETHOMAS - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure		Timescale (Yrs)	Cost £	Links to Strategic Measures	
				WG, NRW & EU	CCBC
TT10	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
TT11	Assess flood risks to the listed building and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£500 (<£100k)	M23	CCBC03

**TOTAL COST OF MEASURES FOR
TRETTHOMAS COMMUNITY AREA:**

£85,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 7
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**LAND DRAINAGE FEATURE IN
TRETTHOMAS**

6.24. Ystrad Mynach Community Area

Overview:

The Ystrad Mynach community is situated towards the centre of the Caerphilly County Borough Council area and covers an area of approximately 6.3 km². The community is largely open fields and farmland except for Ystrad Mynach itself to the east of the area. The existing development is a mixture of residential, industrial/commercial and other services, including schools and a hospital. Neighbouring communities are Maesycwmmmer, Llanbradach, Senghenydd, Nelson, Gelligaer and Hengoed.

The River Rhymney and Nant Cylla (a tributary of the Rhymney) form the eastern boundary of the community and the majority of the area drains in an easterly direction towards the River Rhymney. The Nant Twynrharris and several un-named watercourses flow west to east across the study area discharging to the Nant Cylla and River Rhymney. The River Rhymney is designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

The Natural Resources Wales Flood Map indicates flooding from the River Rhymney (main river) is an important source of flooding in Ystrad Mynach affecting lower lying land adjacent to the river, of particular note the hospital is shown at risk. Defences are present which reduce this risk although the Flood Map suggests these do not provide significant protection in the larger events. The available data indicates flooding from the Nant Cylla and un-named watercourse following the line of the railway, potentially affects roads and properties within Ystrad Mynach, particularly on the approach to the River Rhymney. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of areas in the community. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area.

Available data:

The following flood risk information is currently available for Ystrad Mynach:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties in the developed areas of Ystrad Mynach. Much of this is concentrated around ordinary watercourses, with the main areas affected around Coed Mawr, Tywn Road, the hospital and business park adjacent to the River Rhymney; and in the vicinity of the A472 and Commercial Street. Several of these areas are shown at high risk of flooding with a larger area at low to medium risk. A comparatively high number of properties are also shown at risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly the A472/Commercial Street area and business park to the west; Twyn Road/hospital area; and Nant Twynrharris area. The surface water flood map and in some places the Natural Resources Wales Flood Map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 49 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Penallta Industrial Estate, (West Road), Pen-Y-Bryn.	This is a severe weather culvert. The surface water flood map shows some flooding extent in the area but not excessive.	3	N
Penallta Industrial Estate, surface water pond outfalls.	Surface water pond.	N/A	N/A
Penallta Road.	The surface water flood map indicates overland flows which could affect highway and properties.	3	N
Heol Las 2.	This is a severe weather culvert. The surface water flood maps shows limited flooding. Some incidents have been reported.	3	Y
Heol Las 1, Nelson.	This is a severe weather culvert. The surface water flood map shows limited flooding. Some incidents have been reported.	3	Y
Tredomen Offices.	This is a severe weather culvert. The surface water flood map shows the potential of flooding potentially affecting offices and the mineral railway. No incidents reported in the immediate vicinity.	1/2	Y

Location	Comment	CCTV required (priority)	Capacity check required
Tredomen Park 2.	This is a severe weather culvert. Significant flooding along full length of the stream and incidents reported in the vicinity.	1/2	Y
Caerphilly Road, Tredomen.	This is a severe weather culvert. Significant flooding along full length of the stream and incidents reported in the vicinity.	3	Y
Station Road.	Significant flooding along full length of the stream and incidents reported in the vicinity.	3	Y
Station Road (railway culvert).	Significant flooding along full length of the stream and incidents reported in the vicinity.	2	Y
Lewis Street (school).	Significant flooding along full length of the stream and incidents reported in the vicinity.	2	Y
Church Street.	Significant flooding along full length of the stream and incidents reported in the vicinity.	2	Y
Central Street.	Significant flooding along full length of the stream and incidents reported in the vicinity.	2	Y
Side of Royal Oak Public House, Ystrad Mynach.	Significant flooding along full length of the stream and incidents reported in the vicinity.	2	Y
Rear of Public Conveniences, Ystrad Mynach.	High risk flood path shown, plus incidents recorded.	3	Y
The Pierhead, Ystrad Mynach.	High risk flood path shown, plus incidents recorded.	3	Y
Maes-y-coed Terrace 3.	This is a severe weather culvert. Incidents of flooding have been reported but limited flooding is shown on the surface water flood map.	3	N
Maes-y-coed Terrace 2.	This is a severe weather culvert. Incidents of flooding have been reported but limited flooding is shown on the surface water flood map.	3	N
Maes-y-coed Terrace 1.	This is a severe weather culvert. Incidents of flooding have been reported but limited flooding is shown on the surface water flood map.	2	N

Location	Comment	CCTV required (priority)	Capacity check required
The Clumps, rear of Hospital.	The surface water flood map shows significant flooding along the stream and incidents reported.	2	Y
Edward Street, Ystrad Mynach.	This is a severe weather culvert. The surface water map shows significant flooding along the stream and incidents reported.	3	Y
Caerphilly Road 1, Ystrad Mynach.	This is a severe weather culvert. The surface water map shows significant flooding along the stream and incidents reported.	3	Y
Caerphilly Road 2, Ystrad Mynach.	This is a severe weather culvert. The surface water map shows significant flooding along the stream and incidents reported.	3	Y

Table 49: Important Culverts – Ystrad Mynach

Groundwater – Where it has been classified, Ystrad Mynach is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A high risk area and several low risk areas were identified in Ystrad Mynach. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. Land immediately adjacent to the River Rhymney is shown at risk of main river flooding, including the hospital, residential and commercial properties. Defences are present which reduce this risk but the Flood Map suggests these do not provide significant protection for larger events.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Ystrad Mynach relate to surface water flooding, where the local drainage system is not effective in capturing runoff, or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Part of Ystrad Mynach is shown at risk from the River Rhymney main river. Table 50 summarises the impacts of flooding in Ystrad Mynach based on the surface water flood map. Figure 32 shows the Flood Risk Map.

COUNTS FOR YSTRAD MYNACH COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	5102	341	92	82
<u>Residential Properties at risk of internal flooding</u>				
Residential Properties (n)	2171	59	25	21
Services (n)	66	2	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	634	67	24	14
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	4.4	1.1	0.3	0.2
Agricultural Land – Grades 1, 2 and 3 (ha)	4.0	0.7	0.2	0.7
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	15	1	0	0
Licensed Abstractions (LA) (n)	1	0	0	1
Sites of Interest for Nature Conservation (SINC) (ha)	141.7	4.3	0.9	3.1

Table 50: Impacts of Flooding in Ystrad Mynach - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

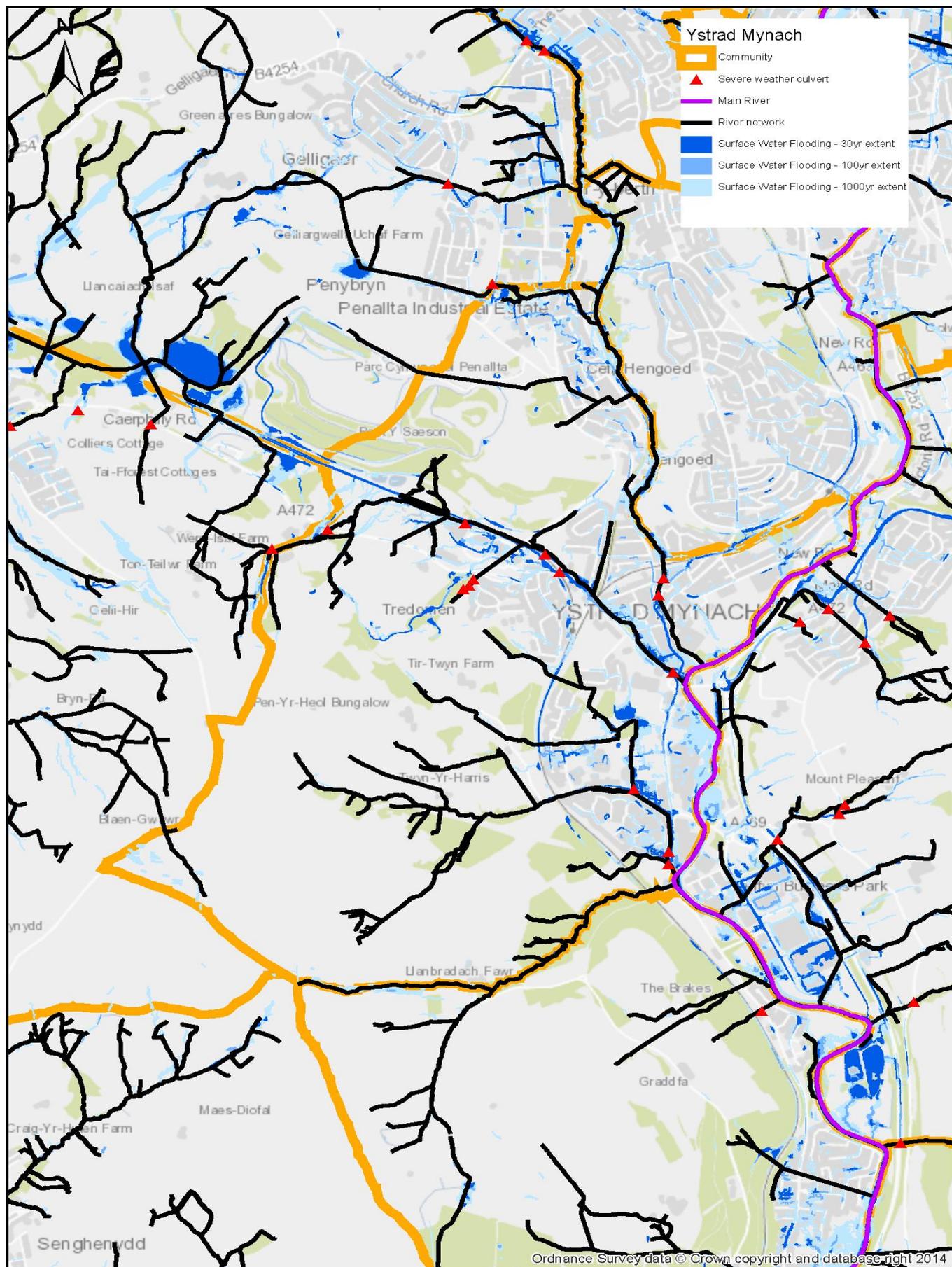


Figure 32: Flood Risk Map for Ystrad Mynach

The main flood risks have been identified as follows:***Coed Mawr/Nant Twyn yr Harris area:***

There are some areas at a high risk of flooding, which are more than likely due to a blockage or the capacity of the ordinary watercourse culverts, the local drainage system and restricted discharges when river levels are high. This area is also shown at risk of flooding from the River Rhymney. Some properties are potentially at high risk of flooding. Further investigations are proposed.

Twyn Road/hospital area:

This area is generally at a high risk of flooding. This is likely due to flooding from ordinary watercourses, which is due to culvert/channel capacity or a blockage. This is potentially exacerbated by flooding from the local drainage system. This area is also shown at risk of flooding from the River Rhymney. Some properties are potentially at high risk of flooding. Further investigations are proposed.

A472/Commercial Street area:

There are some areas at a high risk of flooding affecting highways and properties. The surface water flood map indicates some residential properties may be at risk of flooding and access is likely to be restricted to properties during a flood event. This is likely due to blockage or the capacity of the ordinary watercourse channels/culverts and local drainage system, exacerbated when river levels are high. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Ystrad Mynach.

YSTRAD MYNACH - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
YM01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
YM02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 49 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
YM03 CCTV survey of priority culverts identified in task YM02. Capacity check of priority culverts identified in task YM02.	0 – 5 (2015–2021)	£4K (< £100k)	M24	CCBC03 CCBC04
YM04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5K (< £100k)	N/A	CCBC03
YM05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44 / M53	CCBC20

YSTRAD MYNACH - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
YM06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44	CCBC10
YM07	Use the outcomes from task YM02, YM03, YM05 and YM06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourses. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£80k (4 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
YM08	Subject to funding undertake a prefeasibility study of options to reduce flooding from the Nant Cylla at the Commercial Street culvert (bid already submitted to Welsh Government).	0 – 5 (2015–2021)	£50k (4 sites) (<£100k)	M24 / M34	CCBC27 CCBC28
YM09	Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on un-named watercourses.	0 – 2 (2015–2021)	£30k (~6 sites) (< £100k)	M41 / M42	CCBC25
YM10	Complete GIS exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm)	0 – 2 (2015–2021)	£2.5K (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
YSTRAD MYNACH COMMUNITY AREA:**

£177,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**CONCRETE CANVAS CHANNEL
IN YSTRAD MYNACH**

7. Caerphilly County Borough Council – Whole Borough (community Areas outside the Flood Risk Area)

Overview:

This section covers the 21 Community Areas outside the Flood Risk Area.

These have been presented separately as they are not required for reporting to the European Union.

Conclusions from the Flood Risk Maps:

COUNTS FOR CAERPHILLY COUNTY BOROUGH COUNCIL				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	180924	10472	1835	1199
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	76989	1533	325	236
Services (n)	843	43	13	8
Risk to Economic Activity				
Non-Residential Properties (n)	13525	1155	317	226
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	8.8	2.5	1.0	1.5
Main Line Railways (km)	45.1	5.6	2.0	2.2
Agricultural Land – Grades 1, 2 and 3 (ha)	1866.9	119.2	31.5	60.4
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	69	10	3	2
Special Areas of Conservation (SAC) (ha)	39.8	0.2	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	240.3	7.0	2.4	9.1
Parks and Gardens (ha)	683	7.7	1.8	3.4
Scheduled Ancient Monuments (ha)	64.6	6.7	3.6	2.2
Listed Buildings (n)	369	10	7	17
Licensed Abstractions (LA) (n)	18	5	0	3
Sites of Interest for Nature Conservation (SINC) (ha)	7418.8	5	0	3

Table 51: Caerphilly County Borough Council – Counts for Various Risks

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

Measures and objectives to mitigate flood risk (Revenue & Capital):

Recovery and review 1	Preventing 7
9 Preparing	6 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

TOTAL COST OF MEASURES FOR OUTSIDE THE CCBC FLOOD RISK AREA

COMMUNITY AREA	COST
Abertridwr	£80,500
Abertysswg	£84,500
Argoed	£50,000
Brithdir	£32,500
Deri	£35,000
Fochriw	£35,000
Gelligaer	£64,500
Hengoed	£34,500
Machen	£130,500
Manmoel	£500
Nelson	£110,500
New Tredegar	£34,000
Penpedairheol	£59,000
Pontlottyn	£60,000
Rhymney	£89,500
Rudry	£24,000
Senghenydd	£45,500
Tirphil	£5,500
Tir-y-berth	£60,500
Twyn Carno	£65,000
Ynysddu	£61,500
ESTIMATED TOTAL COST:	£1,162,500

In order for the Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council, on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Adding this sum to the cost of measures within the Flood Risk Area (see section 6.1) gives a total financial requirement of £3,806,500 to implement all the measures within the Caerphilly County Borough Council area.

7.1. Abertridwr Community Area

Overview:

The Abertridwr community is situated in the south west of the Caerphilly County Borough Council area and includes the town of Abertridwr. It covers an area of approximately 6.1 km², the majority of which is open fields and farmland with the main developed area in the centre Abertridwr, adjacent to the Nant Cwm-parc and Nant yr Aber. The existing development is mainly residential although there are likely to be a number of small businesses and commercial properties. Neighbouring communities are Senghenydd, Llanbradach and Caerphilly West. Abertridwr also borders the neighbouring local authority of Rhondda Cynon Taf County Borough Council.

The Abertridwr area generally drains via a number of ordinary watercourses towards the Nant yr Aber which flows in a south easterly direction through the centre of the community. The Nant Cwm-Parc and Nant Cwmceffyl both flow in a southerly direction through the northern extent of Abertridwr before joining the Nant yr Aber on the outskirts of the town. The Nant Llan drains the western fringe of Abertridwr and flows in an easterly direction before discharging to the Nant yr Aber. The Nant Cwm-Byr drains the south western part of the community and flows in a northerly direction before discharging to the Nant yr Aber. The eastern part of Abertridwr is drained by an ordinary watercourse flowing in a southerly direction to the Caerphilly West community. This watercourse discharges to the Nant yr Aber to the south of Abertridwr. There are several other unnamed ordinary watercourses shown on the Ordnance Survey mapping that drain to these rivers. The Nant yr Aber is a designated main river downstream of Abertridwr Square and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the Nant yr Aber.

Sources of flooding:

The available data indicates flooding from the Nant yr Aber (main river), is the main source of flooding in Abertridwr and affects highways and potentially properties adjacent to the river. Flooding from ordinary watercourse is less extensive but does potentially affect highways and properties across the urban area. Problems may also occur in more isolated locations, for example due to culvert restrictions. The information suggests that surface water flooding, where drainage systems cannot cope with high intensity rainfall, is not particularly significant although the surface water flood maps does show a number of areas at low to medium risk and there are some reported flood incidents. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Abertridwr:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or deemed to have potential to occur).
- Details and drawings of a drainage scheme in Garth Estate (2009).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties in Abertridwr, with the main areas affected in the vicinity of Thomas Street. The areas affected are generally classified as low risk. The surface water flood maps take a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of ordinary watercourses are shown at risk of flooding, particularly adjacent to the Nant Llan and Nant Cwm Parc. It is likely that flooding in some of these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 52 shows important culverts that have been identified from the 'At Risk Culvert Register' and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Brook Street.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Garth Estate.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	Y
Side of No 1, Hillside Avenue.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	Y
Rear of No 1, Hendre Road.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map. Reported incident of debris in the culvert.	2	Y
40 Upper Francis Street.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Rear of Bingo Hall, The Square.	This is a severe weather culvert. Significant flooding is shown in the area on the surface water flood map.	2	Y
Cefn llan.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Aberfawr Road.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N

Table 52: Important Culverts – Abertridwr

Groundwater – Where it has been classified, the majority of Abertridwr is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Three areas of Abertridwr are identified at low risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register. No high or medium risk areas were identified in Abertridwr. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main flood risk in Abertridwr relate to main river flooding. Ordinary watercourse flooding where culverts may have restricted capacity, and surface water flooding, where the local drainage system is not effective in capturing runoff, is less extensive however a number of areas are shown to be at risk. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 53 summarises the impacts of flooding in Abertridwr, based on the surface water flood map. Figure 33 shows the Flood Risk Map.

COUNTS FOR ABERTRIDWR COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3657	141	21	7
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Properties (n)	1556	20	2	0
Services (n)	10	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	186	9	2	6
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	4	0	0	0
Licensed Abstractions (LA) (n)	0		0	0
Sites of Interest for Nature Conservation (SINC) (ha)	202.9	2.5	1.0	1.9

Table 53: Impacts of Flooding in Abertridwr - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

The main flood risks have been identified as follows:***Thomas Street area:***

This area is predominantly at a high risk of flooding with wider areas at medium to low risk affecting local highways and recreational facilities. Flooding of the highway is likely to occur due to a blockage or insufficient capacity of the local drainage network. Flooding of the recreational facilities is likely to be caused directly by flooding from the Nant yr Aber (main river). Flood defences are present on the Nant yr Aber to reduce this risk however based on the available information the standard of protection is not particularly high. Further investigations are proposed.

The Square:

This area is generally at a high to medium risk of flooding which is caused by a combination of main river, ordinary watercourse and surface water flooding. A number of culverted ordinary watercourses join the Nant yr Aber at this location and it is difficult to pinpoint the main cause of flooding. Further investigations are proposed.

Woodland Terrace area:

This area is generally at a high to medium risk of flooding with more extensive areas shown at low risk. Flooding in this area is likely due to a combination of ordinary watercourse flooding and surface water flooding. A number of properties are shown to be potentially at medium to high risk of flooding. Many of the reported flood incidents in this area refer to blocked gullies and drains. The land to the north of this area is steeply sloping and there are reported incidents of overland flows flooding a number of houses in Garth Estate. It is believed a filter drain was constructed in 2009 to intercept the overland flows and discharge to the Nant Llan. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Abertridwr.

ABERTRIDWR - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
<p>Flood Forecasting, Warning & Response</p> <p>AT01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.</p>	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
<p>Studies, Assessments & Plans</p> <p>AT02 <u>Site walkovers to:</u></p> <p>Assess condition of culvert structures listed in Table 52 & identify culverts requiring more detailed assessment.</p> <p>Identify features acting as informal or defacto defences in the vicinity of the culverts.</p> <p>Assess the general material and condition of open channels & identify any local pinch-points.</p> <p>Identify any obvious locations where invasive species are present.</p> <p>Assess property threshold levels to better quantify the risk to properties.</p> <p>Identify locations where water quality may be affected by coal water discharges.</p>	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
<p>AT03 CCTV survey of priority culverts identified in task AT02.</p> <p>Capacity check of priority culverts identified in task AT02.</p>	0 – 5 (2015–2021)	£2K (< £100k)	M24	CCBC03 CCBC04
<p>AT04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.</p>	0 – 5 (2015–2021)	£2.5K (< £100k)	N/A	CCBC03
<p>AT05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.</p>	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

ABERTRIDWR - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
AT06	Complete a consultation exercise with local residents, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44 / M53	CCBC14
AT07	Use the outcomes from task AT02, AT03, AT05 and AT06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourse near The Square and Woodland Terrace. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£35k (2 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
AT08	Use the outcomes from task AT02, AT03, AT05 and AT06 to assess the requirement for and scope of feasibility studies to reduce flooding from local drainage systems and ordinary watercourses in the vicinity of Thomas Street. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks (from ordinary watercourses and drainage networks); feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (< £100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
AT09	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5K (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
ABERTRIDWR COMMUNITY AREA:**

£80,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**INTAKE STRUCTURE IN
ABERTRIDWR**

7.2. Abertysswg Community Area

Overview:

The Abertysswg community is situated towards the north of the Caerphilly County Borough Council area and includes the settlement of Abertysswg on the urban fringe of Rhymney town. It covers an area of approximately 2.8km², the majority of which is open fields and farmland with developed areas in the centre of the community. Much of the existing development is residential and there is also likely to be a number of small businesses, commercial properties and other non-residential properties and services in the community. Neighbouring communities are New Tredegar, Tir-phil, Pontlottyn and Rhymney. Abertysswg also borders the neighbouring local authority of Blaenau Gwent County Borough Council.

The River Rhymney forms the western boundary of Abertysswg and the area generally drains to the south and west towards the Rhymney. There are a number of ordinary watercourses and local field drains shown on the Ordnance Survey mapping which discharge to the River Rhymney. The River Rhymney is designated main river through Abertysswg and is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses.

Sources of flooding:

The available information indicates that flooding from the River Rhymney (main river), and ordinary watercourses is the main source of flooding in Abertysswg. The Natural Resources Wales Flood Map shows that the land immediately adjacent to the River Rhymney and the southern fringe of the urban area of Abertysswg could be affected by fluvial flooding. Surface water flooding, where drainage systems cannot cope with high intensity rainfall, is less extensive but may still affect a number of properties and highways across the urban area. Flooding from the smaller ordinary watercourses may also affect a number of areas in Abertysswg. As many of the watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area.

Available data:

The following flood risk information is currently available for Abertysswg:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of at risk culverts (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban area of Abertysswg, with the main areas affected in the vicinity of Warn's Terrace, Station Road and near to the school. The surface water flood map generally shows the wider area to be at low risk with more isolated areas at high to medium risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies and storm sewers.

Ordinary Watercourses – Ordinary watercourse flooding may affect the urban area of Abertysswg, particularly near Station Road, Barkley Street and Warn’s Terrace. The surface water and Natural Resources Wales Flood Maps are based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 54 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Abertysswg Road.	This is a severe weather culvert. Significant flooding is shown in the area. Reported incident of flood risk due to culvert blockage.	2	Y
Warnes Terrace 1.	This is a severe weather culvert. Reasonable flooding is shown in the area. Reported incident of culvert blockage.	3	Y
Warnes Terrace 2.	This is a severe weather culvert. Reasonable flooding is shown in the area.	3	Y
Warnes Terrace 3.	This is a severe weather culvert. Limited flooding is shown in the area. Reported flood incident due to culvert blockage.	2	Y

Table 54: Important Culverts – Abertysswg

Groundwater – The western half of Abertysswg is shown to have medium susceptibility to groundwater flooding with the eastern half shown to have low susceptibility, based on the underlying geology. There are a number of old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Three low risk areas were identified in Abertysswg. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There may be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Abertysswg relate to ordinary watercourse and surface water flooding. Surface water flooding, where the local drainage system is not effective in capturing runoff, is shown to affect a number of developed areas in Abertysswg, particularly in the south, although the risk is generally classified as low. Flooding from ordinary watercourses affects several areas. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 55 summarises the impacts of flooding in Abertysswg, based on the surface water flood map. Figure 34 shows the Flood Risk Map.

COUNTS FOR ABERTYSSWG COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	1473	87	12	24
<u>Residential Properties at risk of internal flooding</u>				
Properties (n)	627	14	1	7
Services (n)	7	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	80	12	1	5
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	0	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	5.0	1.3	0.6	1.9

Table 55: Impacts of Flooding in Abertyswg - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

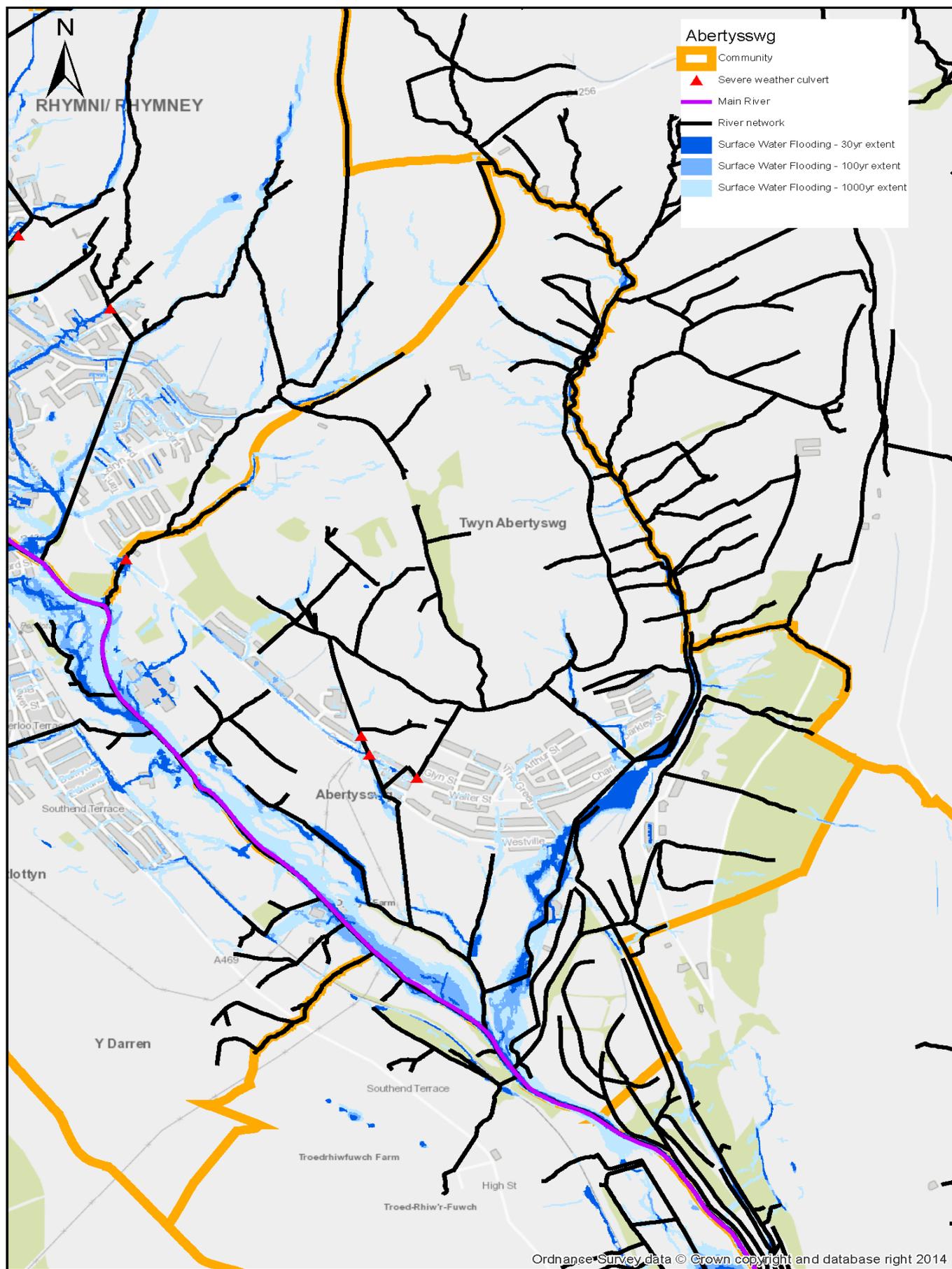


Figure 34: Flood Risk Map for Abertyswg

The main flood risks have been identified as follows:***Station Road area:***

This area is generally at a high to medium risk of flooding affecting a number of properties, this is most likely due to a blockage or insufficient capacity of the local drainage network and ordinary watercourse. Flooding from drainage systems is likely to be exacerbated when water levels in the adjacent watercourse are high. Many of the reported flood incidents in this area refer to blocked gullies and storm drains. Further investigations are proposed.

Warn's Terrace area:

This area is generally at a medium to low risk of flooding with more isolated locations shown at high risk on the surface water flood maps. Flooding in this area is likely due to a combination of surface water flooding and flooding from ordinary watercourse culverts. Many of the reported incidents refer to blocked gullies or culverts. Further investigations are proposed.

Abertysswg Road area:

This area is generally at a high to medium risk of flooding affecting highways and potentially a number of properties, including a school. Flooding in this area is likely due to a blockage or insufficient capacity of the local drainage network and the culvert at Abertysswg Road. The school adjacent to the River Rhymney is shown to be at high risk on the surface water flood maps and access may be restricted during large flood events. During larger flooding events, this school is also shown to be affected by main river flooding from the River Rhymney. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Abertysswg.

ABERTYSSWG - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
AY01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
AY02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 54 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
AY03 CCTV survey of priority culverts identified in task AY02. Capacity check of priority culverts identified in task AY02.	0 – 5 (2015–2021)	£1k (< £100k)	M24	CCBC03 CCBC04
AY04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
AY05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

ABERTYSSWG - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
AY06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC14
AY07 Use the outcomes from tasks AY02, AY03, AY05 and AY06 to assess the requirement for and scope of a feasibility study to reduce flooding from ordinary watercourses. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (3 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
AY08 Use the outcomes from task AY02, AY03, AY05 and AY06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
AY09 Subject to funding, assess the need for and install trash screen/inlet monitors on key culverts.	0 – 2 (2015–2021)	£20k (4 sites) (<£100k)	M41 / M42	CCBC02 CCBC23
AY10 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm)	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
ABERTYSSWG COMMUNITY AREA:**

£84,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**INTAKE STRUCTURE
IN ABERTYSSWG**

7.3. Argoed Community Area

Overview:

The Argoed community is situated towards the north east of the Caerphilly County Borough Council area and includes the town Argoed. It covers an area of approximately 5.6km², the majority of which is open fields and farmland with developed areas adjacent to the River Sirhowy in the centre of the community. The existing development is mainly residential although there are likely to be a number of small businesses and commercial properties. Neighbouring communities are Manmoel, Crumlin, Penmaen, Blackwood, Aberbargoed and Markham. Argoed also borders the neighbouring local authority of Blaenau Gwent County Borough Council.

The River Sirhowy flows in a southerly direction through the centre of Argoed and the majority of the areas drain towards the River Sirhowy. The Nant Gwrhay forms the southern boundary of Argoed and flows in a westerly direction towards the Sirhowy. The Nant Cwm-Crach drains the western part of Argoed and joins the River Sirhowy in the town of Argoed. There are several other un-named watercourses shown on Ordnance Survey mapping that drain to these rivers. It is assumed the residential areas are drained via the local sewer network or culverted watercourses discharging to the River Sirhowy or its tributaries. The River Sirhowy is designated as a main river and therefore is the responsibility of Natural Resources Wales.

Sources of flooding:

Main river flooding, from the River Sirhowy, is the main source of flooding in Argoed and affects local highways and potentially a number of properties in the urban area. Surface water flooding, where drainage systems cannot cope with high intensity rainfall, is less extensive but potentially affects a number of areas in Argoed, particularly in more extreme events. Ordinary watercourse flooding is not particularly extensive although some urban areas may be at risk, particularly near the Nant Cwm-Crach. Problems may also occur in more isolated locations, for example due to culvert restrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Argoed:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or is deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties in Argoed. Several areas are shown at low risk with isolated areas shown at medium to high risk. The areas most affected by surface water flooding are in the vicinity of High Street. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies and storm sewers. This may be exacerbated when water levels in the River Sirhowy and its tributaries are higher.

Ordinary Watercourses – Flooding from ordinary watercourses (particularly the Nant Cwm-Crach) may be contributing to the flooding in the vicinity of High Street. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 56 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Heol Pan Rhiw-Eglwys 1.	This is a severe weather culvert. Limited flooding is shown in the area.	3	N
Heol Pan Rhiw-Eglwys 2.	This is a severe weather culvert. Limited flooding is shown in the area.	3	N
A4048.	This is a severe weather culvert. Limited flooding is shown in the area.	3	N
Sunny View.	This is a severe weather culvert. Reasonable flooding is shown in the area. Reported incident of culvert blockage.	2	Y
Cwmgelli to Rock Villas 1.	This is a severe weather culvert. Limited flooding is shown in the area.	3	N
Cwmgelli to Rock Villas 2.	This is a severe weather culvert. Limited flooding is shown in the area.	3	N
Chris Waite Garages.	This is a severe weather culvert. Limited flooding is shown in the area.	3	N
Rock Public House.	This is a severe weather culvert. Reasonable flooding is shown in the area.	2	Y
Roch Fach Lane.	This is a severe weather culvert. Limited flooding is shown in the area.	3	N
Maes Manor Lane 2.	This is a severe weather culvert. Limited flooding is shown in the area.	3	N

Table 56: Important Culverts – Argoed

Groundwater – Where it has been classified, the majority of Argoed is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Parts of the Caerphilly County Borough Council area were identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register, however this does not include the Argoed community.

Interaction with main river – There is likely to be some interaction with the River Sirhowy for drainage networks in the west of Argoed where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Argoed relate to surface water flooding, where the local drainage system is not effective in capturing runoff and ordinary watercourse flooding. The flooding is not particularly extensive but the surface water flood maps indicate a number of highways and properties could be affected. The reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The land adjacent to the River Sirhowy, including some properties, is shown to be at risk from main river flooding. Table 57 summarises the impacts of local flooding in Argoed, based on the surface water flood map. Figure 35 shows the Flood Risk Map.

COUNTS FOR ARGOED COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	881	14	7	9
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	375	3	3	2
Services (n)	0	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	134	4	1	1
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	2	0	0	1
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	97.2	4.8	1.5	4.2

Table 57: Impacts of Flooding in Argoed - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

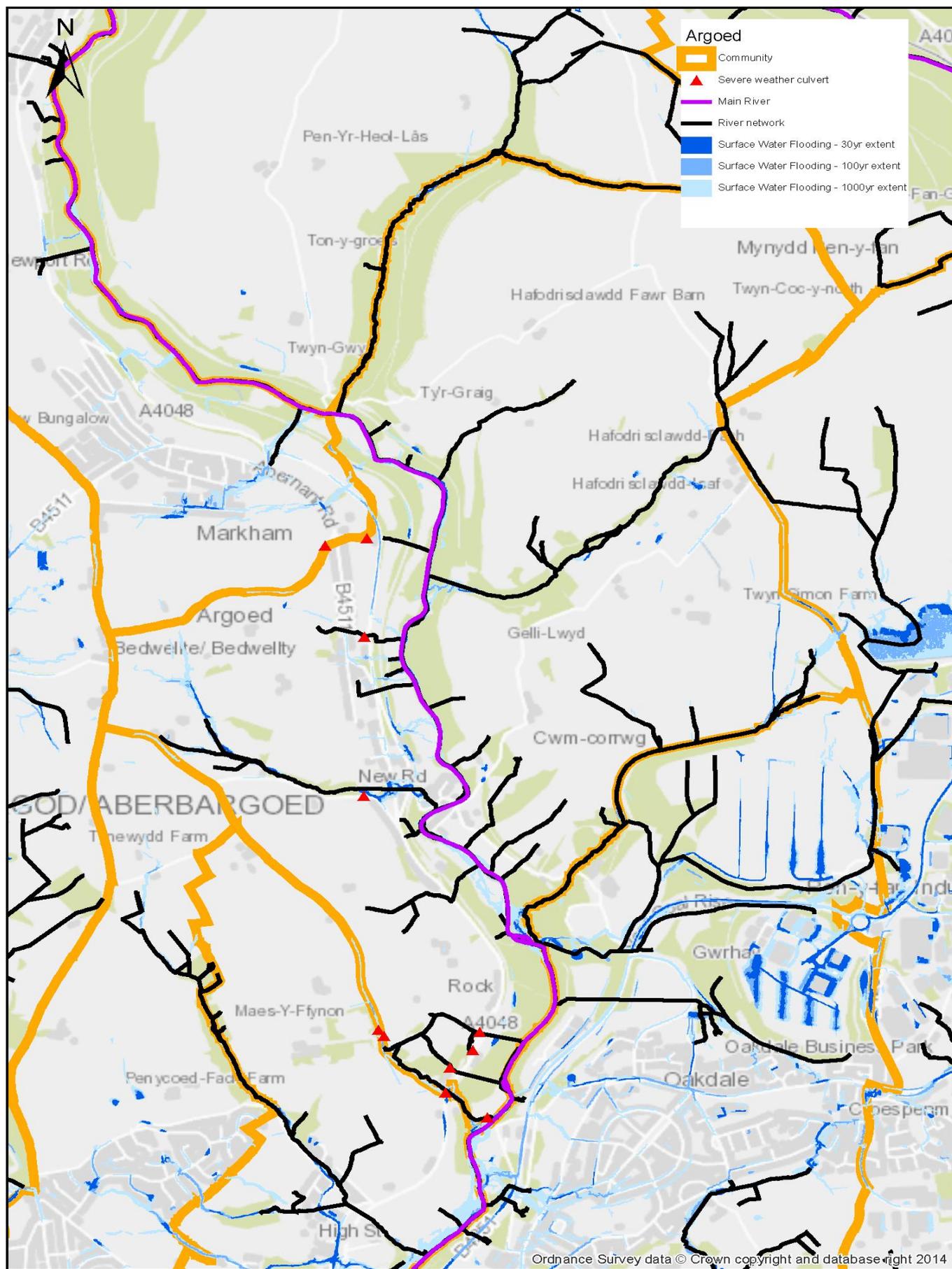


Figure 35: Flood Risk Map for Argoed

The main flood risks have been identified as follows:***High Street area:***

This area is generally at a high to medium risk of flooding affecting roads and potentially properties. Flooding in this area is likely due to a combination of a blockage or insufficient capacity of the local drainage network and the capacity or blockage of the Nant Cwm-Crach culvert. The flooding is likely to be exacerbated when the water levels in the River Sirhowy are high. The Natural Resources Wales Flood Maps show that this area, including a number of properties, is also at risk from main river flooding during larger events. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Argoed.

ARGOED - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
AG01 Community Flood Plan – Investigate and establish local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
AG02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 56 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
AG03 CCTV survey of priority culverts identified in task AG02. Capacity check of priority culverts identified in task AG02.	0 – 5	£1k (< £100k)	M24	CCBC03 CCBC04
AG04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
AG05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

ARGOED - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
AG06	Undertake a local community consultation exercise to improve understanding of flooding issues, causes and impacts and inform response plans.	0 – 2 (2015–2021)	£2.5k (<£100k)	M24 / M44 / M53	CCBC14
AG07	Use the outcomes from task AG02, AG03, AG05 and AG06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems and ordinary watercourses in the High Street area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
AG08	Assess the need for trash screen/inlet monitors at Nant Cwm-Crach culvert.	0 – 2 (2015–2021)	£5k (inc installation) (<£100k)	M41 / M42	CCBC02 CCBC23
AG09	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (flood depths < 600mm).	0 – 2 (2015–2021)	£2.5k (all CCBC) (< £100k)	M23	CCBC25
AG10	Assess flood risks to the listed buildings and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£500 (<£100k)	M23	CCBC03

**TOTAL COST OF MEASURES FOR
ARGOED COMMUNITY AREA:****£50,000**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.4. Brithdir Community Area

Overview:

The Brithdir community is situated towards the north of the Caerphilly County Borough Council area and includes the urban fringe of New Tredegar. It covers an area of approximately 1.97 km², which is largely open fields and farmland with development situated along the north eastern fringe. Much of the existing development is residential and there may also be a number of small businesses and commercial properties and services. Neighbouring communities are Tir-phil, New Tredegar, Aberbargoed, Bargoed and Deri.

The River Rhymney forms the eastern boundary of the community and the majority of the area drains in an easterly direction towards the River Rhymney. The Nant Llan forms the south western boundary of Brithdir and flows in a southerly direction before discharging to the Nant Bargod Rhymni approximately 40m to the south of Brithdir. The western fringe of the community drains in a westerly direction towards the Nant Llan with the southern part of Brithdir draining to the Nant Bargod Rhymni. The Ordnance Survey Mapping shows a number of ordinary watercourses near the perimeter of Brithdir which discharge to the larger rivers. The River Rhymney is designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

The Natural Resources Wales Flood Map indicates the extent of flooding from the River Rhymney (main river) is limited to the lower lying land adjacent to the river. The available data indicates flooding from ordinary watercourses is not particularly extensive. Problems may occur in more isolated locations, for example due to culvert restrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information indicates surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of areas in the community. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways in the urban area.

Available data:

The following flood risk information is currently available for Brithdir:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culverts (where flooding has previously occurred or is deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties in the developed areas of Brithdir, with Station Road and the railway line being the areas most affected. Some areas are shown at high risk of flooding although properties are generally not shown at risk except in larger events. The surface water flood map takes a generalised approach to the representation of drainage systems and may not include all culverts which carry runoff flows to the river. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Limited flooding is shown in the vicinity of ordinary watercourses. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. There are no culverts in Brithdir identified in the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Groundwater – Where it has been classified, Brithdir is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Two low risk areas were identified in Brithdir. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. The undeveloped land immediately adjacent to the River Rhymney is shown at risk of main river flooding.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Brithdir relate to surface water flooding, where the local drainage system is not effective in capturing runoff. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Part of Brithdir is shown at risk from the River Rhymney (main river) in larger flood events although only undeveloped lands are shown to be at risk. Table 58 summarises the impacts of flooding in Brithdir based on the surface water flood map. Figure 36 shows the Flood Risk Map.

COUNTS FOR BRITHDIR COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	768	7	7	7
<u>Residential Properties at risk of flooding >0.2m</u>				
Properties (n)	327	2	4	2
Services (n)	5	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	73	1	1	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	2.5	0.1	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	1	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	19.7	0.8	0.4	1.1

Table 58: Impacts of Flooding in Brithdir - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

The main flood risks have been identified as follows:***Station Road:***

This area is generally at a medium to low risk of flooding, more than likely due to a blockage or the capacity of the local drainage system. The surface water flood maps indicate a section of Station Road is at high risk with a small number of properties at medium to low risk. Further investigations are proposed.

Railway line:

A section of the railway line in the south of Brithdir is shown to be at high risk of flooding in the surface water flood maps. This is likely due to a blockage or the capacity of the ordinary watercourse and local drainage network. Flooding may be exacerbated in this area when river levels are high. No further investigations in this area are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Brithdir.

BRITHDIR - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
BD01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
BD02 <u>Site walkovers to:</u> Assess condition of culvert structures & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
BD03 CCTV survey of priority culverts identified in task BD02. Capacity check of priority culverts identified in task BD02.	0 – 5 (2015–2021)	£1k (< £100k)	M24	CCBC03 CCBC04
BD04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
BD05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

BRITHDIR - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
BD06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£1.5k (< £100k)	M24 / M44 / M53	CCBC14
BD07	Use the outcomes from task BD02, BD03, BD05 and BD06 to assess the requirement for and scope of studies to reduce flooding at Station Road and to the railway. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (2 sites) (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
BD08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£1.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
BRITHDIR COMMUNITY AREA:****£32,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.5. Deri Community Area

Overview:

The Deri community is situated towards the north west of Caerphilly County Borough Council area and includes the town of Deri. It covers an area of approximately 11.2 km², the majority of which is open fields, farmland and woodland with the developed areas in the centre of the community, adjacent to the Nant Bargod Rhymni. Much of the existing development is residential although there are also likely to be a number of small business and commercial properties and other non-residential properties and services. Neighbouring communities are Fochriw, Tir-phil, Brithdir, Bargoed, Penpedairheol and Gelligaer. Deri also borders the neighbouring local authority of Merthyr Tydfil County Borough Council.

The Nant Bargod Rhymni flows in a southerly direction through the centre of Deri and the area generally drains towards it via a number of ordinary watercourses and local field drains. The western part of Deri drains to the Nant Bargod Rhymni via the Nant y Felin and Nant y Twpa which flow through Deri in a south easterly direction. The eastern fringe of the area is drained by the Nant Llan which joins the Nant Bargod Rhymni south east of Deri. The Nant Bargod Rhymni is designated a main river for the majority of its length in Deri although the northern most reach is ordinary Watercourse. The designated section of the river is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and Nant Bargod Rhymni.

Sources of flooding:

The information available indicates flooding in Deri is not particularly extensive with the main risks due to flooding from the Nant Bargod Rhymni (main river) and ordinary watercourses. Surface water flooding, where local drainage systems cannot cope with high intensity rainfall, may also affect some areas more distant from watercourses, however the surface water flood map indicates these are isolated and generally low risk. As many of the ordinary watercourses are culverted where they flow through urban areas it is difficult to distinguish between surface water flooding and ordinary watercourse flooding and it is likely the two are closely linked. The Natural Resources Wales flood maps indicate that main river flooding may occur on the land adjacent to the Nant Bargod Rhymni although it is mainly undeveloped land and recreation facilities with potentially a small number of properties affected.

Available data:

The following flood risk information is currently available for Deri:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of at risk culverts (where flooding has previously occurred or deemed to have potential to occur);
- Flood assessment and tender drawings relating to culvert improvements at Cross Street (2010).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show that surface water flooding in Deri is not particularly extensive. The Mill Road area is the worst affected, however this is most likely due to the watercourse. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 59 shows important culverts that have been identified from the 'At Risk Culvert Register'. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Park-Cwm-Darren.	This is a surface water culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Bailey Street.	This is a surface water culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Top of Cross St/Deri Newydd.	This is a surface water culvert. Limited flooding is shown in the area on the surface water flood map. It is believed a new culvert was constructed in this area in 2010.	3	N
11 Watson Terrace.	This is a surface water culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Mill Road 2.	This is a surface water culvert. Reasonable flooding is shown in the area on the surface water flood map. Reported incident of flooding due to a culvert blockage in the area.	2	Y
Side of No 4 Mill Road.	This is a surface water culvert. Reasonable flooding is shown in the area on the surface water flood map. Reported incident of flooding due to a culvert blockage in the area.	2	Y
Factory Road.	This is a surface water culvert. Limited flooding is shown in the area on the surface water flood map. Reported incident of flooding due to a culvert blockage in the area.	2	Y

Table 59: Important Culverts - Deri

Groundwater – Where it has been classified, the majority of Deri is shown to have low susceptibility to groundwater flooding, based on the underlying geology. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Two low risk areas were identified in the centre of the community. It is important to note that once properties have been included in the DG5 register this means funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the Nant Bargod Rhymni for drainage networks and ordinary watercourses in the south of Deri where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Deri relate to ordinary watercourses, where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Flooding from the Nant Bargod Rhymni (main river) affects mostly undeveloped land adjacent to the river. Table 60 summarises the impacts of flooding in Deri, based on the surface water flood map. Figure 37 shows the Flood Risk Map for Deri.

COUNTS FOR DERI COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	1304	12	2	7
<u>Residential Properties at risk of internal flooding</u>				
Residential Properties (n)	555	3	0	2
Services (n)	5	1	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	165	9	2	1
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	1.6	0	0	0
Listed Buildings (n)	2	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	485.9	11.1	3.4	9.5

Table 60: Impacts of Flooding in Deri - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

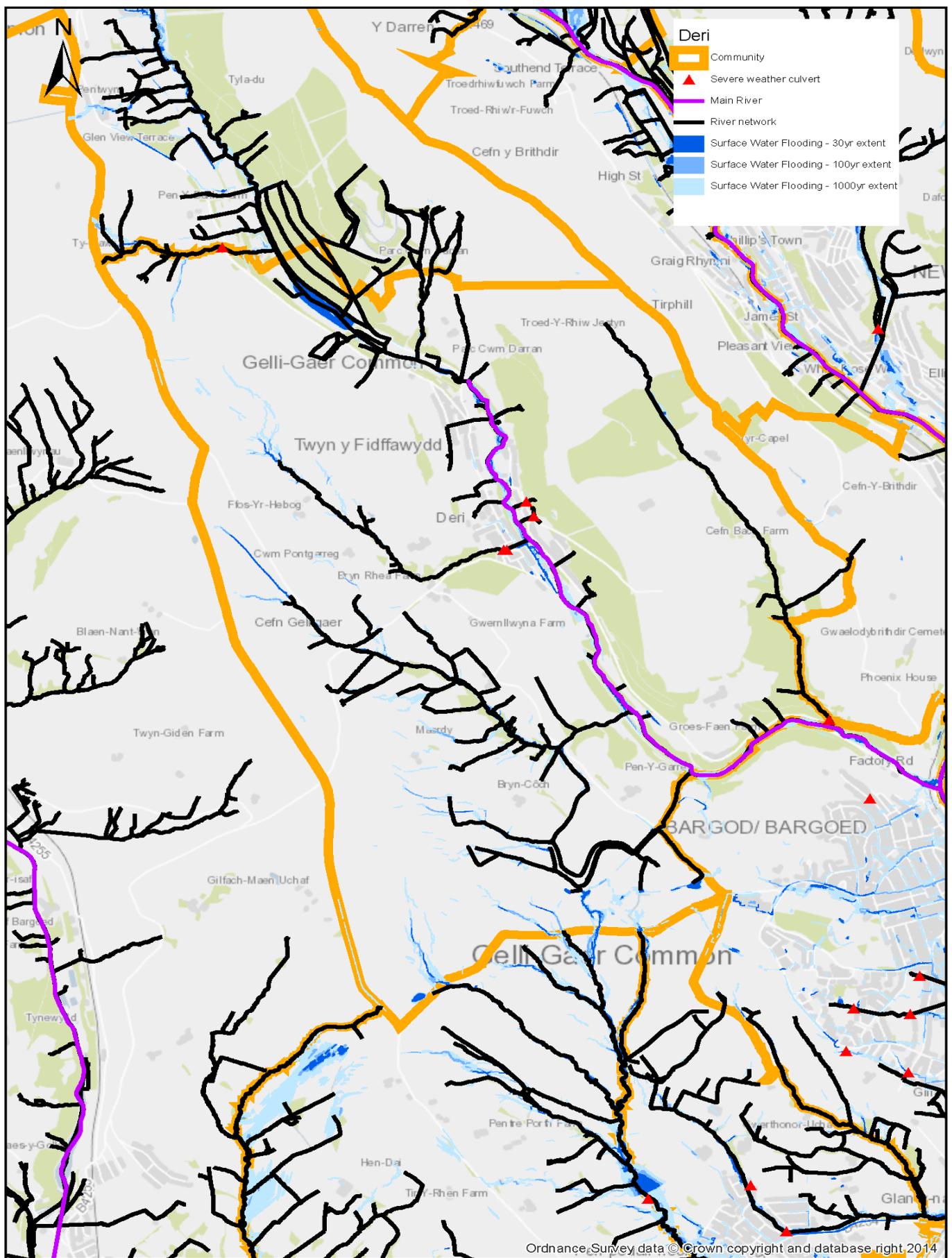


Figure 37: Flood Risk Map for Deri

The main flood risks have been identified as follows:***Mill Road area:***

This area is generally at a high to medium risk of flooding which is more than likely due to a blockage or insufficient capacity of the ordinary watercourse culverts. Flooding in this area is likely to be exacerbated when water levels in the Nant Bargod Rhymni are high. Many of the reported flood incidents in the area relate to blocked gullies and sewers. There are also reported flood incidents relating to culvert blockages. During larger flood events, the Natural Resources Wales Flood Maps indicate this area, including a small number of properties, are also shown to be at risk of main river flooding from the Nant Bargod Rhymni. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in Caerphilly County Borough. Based on a review of the available information the following specific implementation measures are currently proposed for Deri.

DERI - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
<p>Flood Forecasting, Warning & Response</p> <p>DR01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.</p>	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
<p>Studies, Assessments & Plans</p> <p>DR02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 59 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.</p>	0 – 1 (2015–2021)	£500 (< £100k)	M24	CBBC03
<p>DR03 CCTV survey of priority culverts identified in task DR02. Capacity check of priority culverts identified in task DR02.</p>	0 – 5 (2015–2021)	£1.5k (< £100k)	M24	CCBC03 CCBC04
<p>DR04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.</p>	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
<p>DR05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.</p>	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

DERI - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
DR06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC14
DR07	Use the outcomes from tasks DR02, DR03, DR05 and DR066 to assess the requirement for and scope of a feasibility study to reduce flooding from the Nant Y Felin. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£15k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
DR08	Use the outcomes from tasks DR02, DR03, DR05 and DR06 to assess the requirement for and feasibility of trash screen/inlet monitor on ordinary watercourse near Chapel Street where several incidents have been reported.	0 – 2 (2015–2021)	£5k (inc installation) (<£100k)	M41 / M42	CCBC02 CCBC23
DR09	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
DERI COMMUNITY AREA:****£35,000**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
7 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.6. Fochriw Community Area

Overview:

The Fochriw community is situated towards the north west of the Caerphilly County Borough Council area and includes the town of Fochriw. It covers an area of approximately 8.4 km², the majority of which is open fields, farmland and woodland with the developed area of Fochriw in the centre of the community, adjacent to the Nant Bargod Rhymni. Much of the existing development is residential although there are also likely to be a number of small business and commercial properties and other non-residential properties and services. Neighbouring communities are Deri, Tir-phil, Pontlloyn and Twyn Carno. Fochriw also borders the neighbouring local authority of Merthyr Tydfil County Borough Council.

The Nant Bargod Rhymni flows in a southerly direction through the centre of Fochriw and the area generally drains towards it via a number of other ordinary watercourses and local field drains. There are also two ponds located within Fochriw, the Rhaslas Pond in the north of the community and an unnamed pond to the west of the urban area of Fochriw. The north eastern fringe of Fochriw drains to the River Rhymney to the east. The Nant Bargod Rhymni becomes a designated main river downstream of Fochriw. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and the Nant Bargod Rhymni.

Sources of flooding:

The information available indicates flooding in Fochriw is not particularly extensive with the main risks due to a combination of surface water flooding, where local drainage systems cannot cope with high intensity rainfall, and ordinary watercourse flooding. Problems may also occur in isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they flow through urban areas it is difficult to distinguish between surface water flooding and ordinary watercourse flooding and it is likely that they are closely linked. The Natural Resources Wales Flood Maps also indicate that areas downstream of the Rhaslas Pond could be at risk of a breach in the reservoir embankment. Natural Resources Wales are responsible for the management of flooding from reservoirs.

Available data:

The following flood risk information is currently available for Fochriw:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show that flooding in Fochriw is not particularly extensive with the Cae Glas and Coronation Crescent areas the worst affected. Several areas are shown at high to medium risk with wider areas shown at low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 61 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Parc Cwm Darren to Bailey Street.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N

Table 61: Important Culvert - Fochriw

Groundwater – Where it has been classified, the majority of Fochriw is shown to have low susceptibility to groundwater flooding, based on the underlying geology. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Two low risk areas were identified in the centre of the community. It is important to note that once properties have been included in the DG5 register this means funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Fochriw relate to surface water, where the local drainage system is not effective in capturing runoff, and ordinary watercourses, where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies or sewers. Table 62 summarises the impacts of flooding in Fochriw, based on the surface water flood map. Figure 38 shows the Flood Risk Map for Fochriw.

COUNTS FOR FOCHRIW COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	1241	61	14	0
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	528	4	0	0
Services (n)	6	0	0	1
Risk to Economic Activity				
Non-Residential Properties (n)	109	4	1	2
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	0	0	0	0
Licensed Abstractions (LA) (n)	1	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	507.9	17.7	4.7	6.5

Table 62: Impacts of Flooding in Fochriw - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

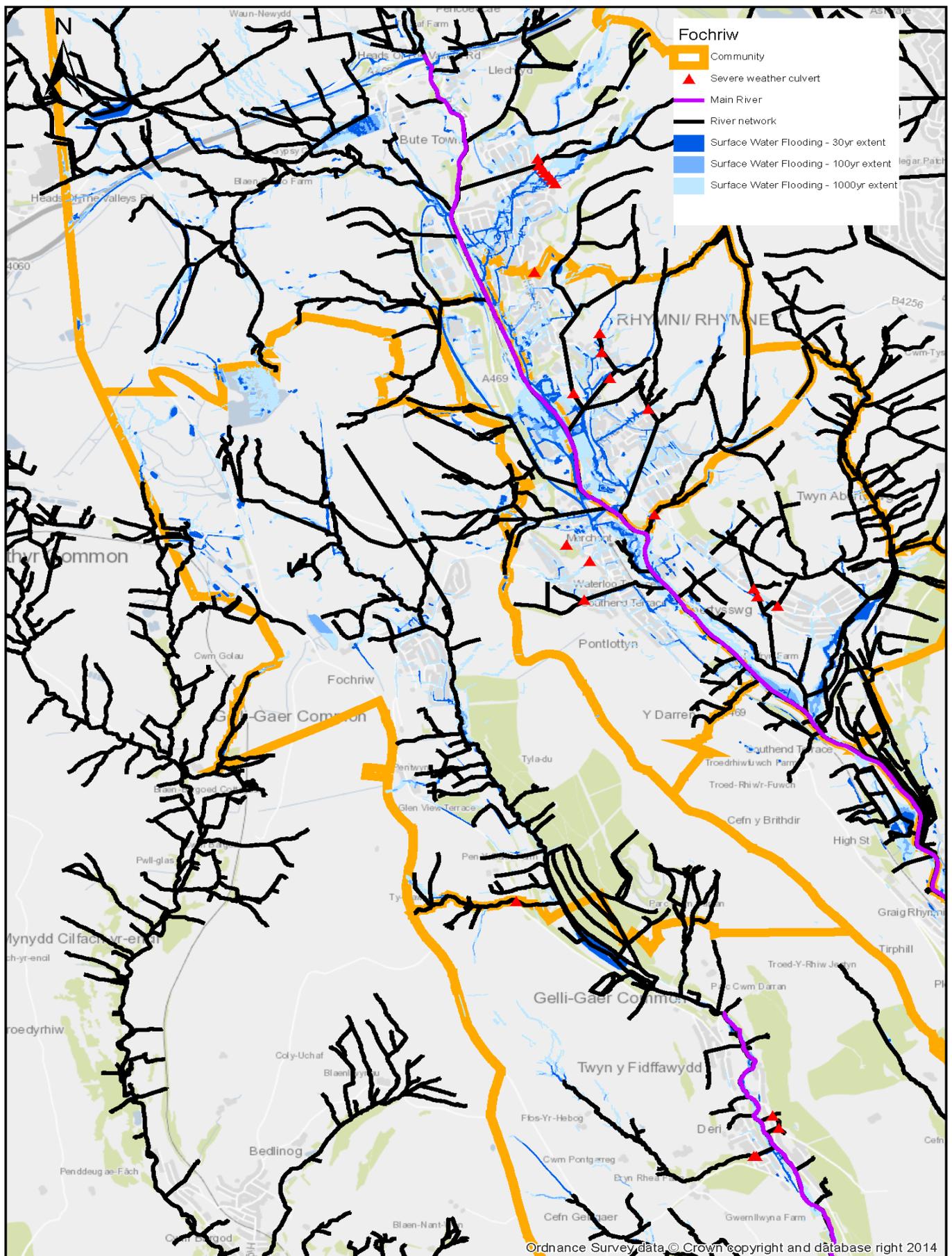


Figure 38: Flood Risk Map for Fochriw

The main flood risks have been identified as follows:***Cae Glas area:***

This area is generally at a high and medium risk of flooding mainly affecting highways which is likely due to a blockage or insufficient capacity of the local drainage system and ordinary watercourse culverts. Access to properties may be restricted during large flood events given the extent of highway flooding shown on the surface water maps. Flooding in this area is likely to be exacerbated when water levels in the Nant Bargod Rhymni are high. Further investigations are proposed.

Coronation Crescent area:

This area is generally at a high and medium risk of flooding which is likely due to a blockage or insufficient capacity of the local drainage system. The surface water flood maps indicate highways and potentially properties may be affected, however there are no reported incidents. Flooding in this area is likely to be exacerbated when water levels in the Nant Bargod Rhymni are high. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Fochriw

FOCHRIW - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
FR01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
FR02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 61 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
FR03 CCTV survey of priority culverts identified in task FR02. Capacity check of priority culverts identified in task FR02.	0 – 5 (2015–2021)	£1.5k (< £100k)	M24	CCBC03 CCBC04
FR04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
FR05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

FOCHRIW - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
FR06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44/ M53	CCBC14
FR07	Use the outcomes from task FR02, FR03, FR05 and FR06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourses near Cae-Glas. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
FR08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
FOCHRIW COMMUNITY AREA:****£35,000**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
5 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.7. Gelligaer Community Area

Overview:

The Gelligaer community is situated towards the west of the Caerphilly County Borough Council area and includes the town of Gelligaer. It covers an area of approximately 8.8 km², the majority of which is open fields, farmland and woodland with the developed area of Gelligaer in the east of the community. Much of the existing development is residential although there is an industrial estate located along the eastern boundary of the community. There are also likely to be a number of small business and commercial properties and other non-residential properties and services. Neighbouring communities are Nelson, Ystrad Mynach, Hengoed, Penpedairheol and Deri. Gelligaer also borders the neighbouring local authority of Merthyr Tydfil County Borough Council.

The Nant Cylla forms the eastern boundary of Gelligaer and the eastern half of the area generally drains towards this watercourse. The western part of Gelligaer drains towards the Nant Caeach which flows in a southerly direction along the western boundary of Gelligaer before joining the Bargod Taf in the west. There are several unnamed watercourses and local field drains shown on the Ordnance Survey mapping that discharge to the larger rivers. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and the Nant Cylla.

Sources of flooding:

The information available indicates the main risks of flooding in Gelligaer are due to a combination of surface water flooding, where local drainage systems cannot cope with high intensity rainfall, and ordinary watercourse flooding. Problems may also occur in isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they flow through urban areas it is difficult to distinguish between surface water flooding and ordinary watercourse flooding and it is likely that they are closely linked.

Available data:

The following flood risk information is currently available for Gelligaer:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps indicate a number of highways and potentially residential and industrial properties within Gelligaer at risk of flooding, with Church Road/Oxford Road and the Industrial Estate the worst affected. Several areas are shown at high to medium risk with more extensive areas shown at low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 63 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Nant Cylla Attenuation Pond.	This is a severe weather culvert. Outfall from attenuation pond.	3	N
No. 1 Heol-Cattwg.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y
Penallta Industrial Estate.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y

Table 63: Important Culverts - Gelligaer

Groundwater – Where it has been classified, the majority of Gelligaer is shown to have low susceptibility to groundwater flooding, based on the underlying geology. Two areas of medium susceptibility were identified in the east and south west of Gelligaer. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. No areas in Gelligaer at risk of sewer flooding were identified.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Gelligaer relate to surface water, where the local drainage system is not effective in capturing runoff, and ordinary watercourses, where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies or sewers. Table 64 summarises the impacts of flooding in Gelligaer, based on the surface water flood map. Figure 39 shows the Flood Risk Map for Gelligaer.

COUNTS FOR GELLIGAER COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	2992	136	19	12
<u>Residential Properties at risk of internal flooding >0.2m</u>				
Properties (n)	1273	21	1	2
Services (n)	16	1	0	1
Risk to Economic Activity				
Non-Residential Properties (n)	333	12	4	5
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	27.2	2.9	1.3	7.5
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	8.6	0.1	0	0
Listed Buildings (n)	7	1	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	139.6	10.4	2.1	5.3

Table 64: Impacts of Flooding in Gelligaer - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

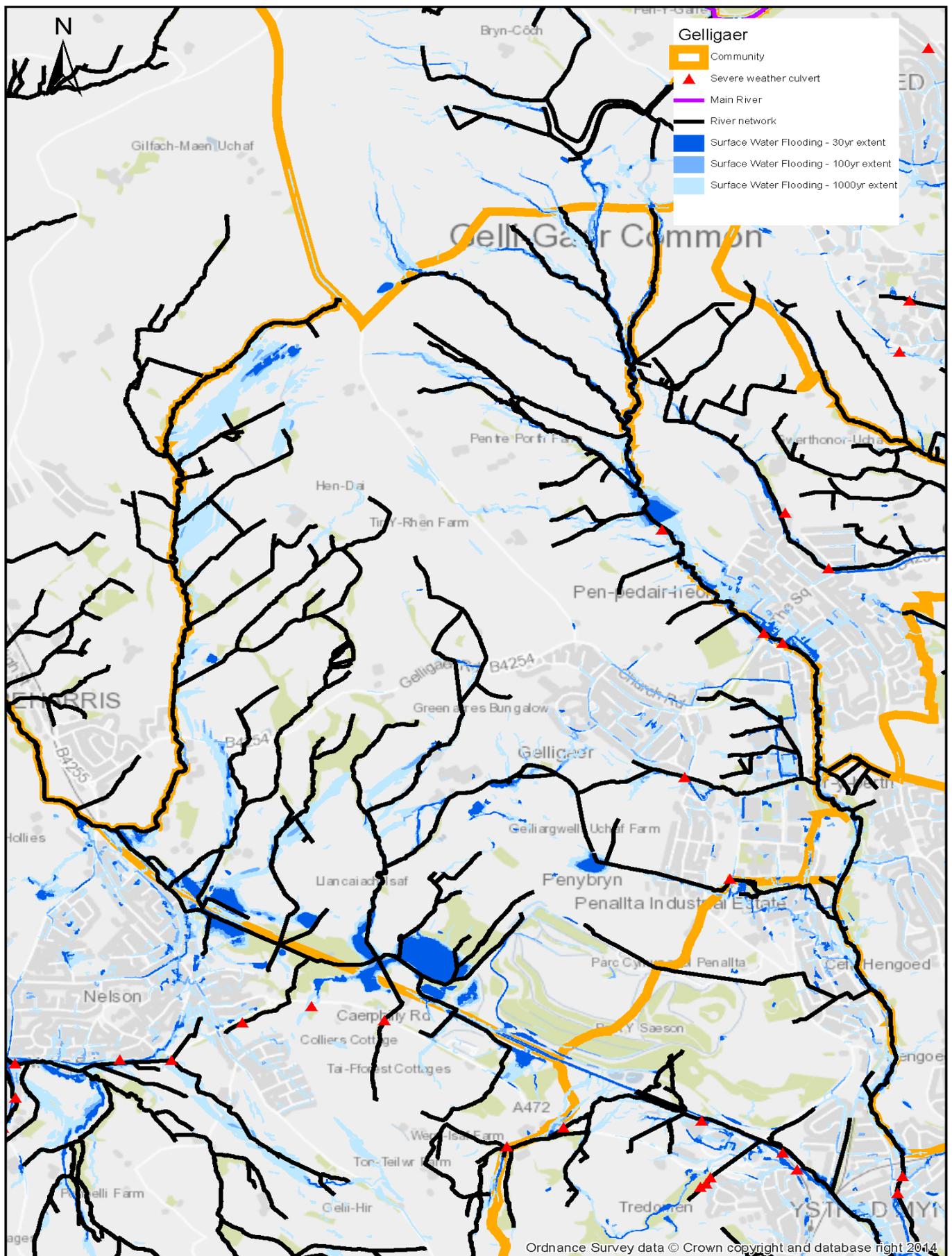


Figure 39: Flood Risk Map for Gelligaer

The main flood risks have been identified as follows:

Church Road/Oxford Road area:

This area is generally at a high to medium risk of flooding affecting highways and potentially a small number of properties. Flooding in this area is likely due to a blockage or the insufficient capacity of the local drainage network. Many of the reported flood incidents in the area relate to blocked gullies and storm sewers. Flooding in this area is likely to be exacerbated when water levels in the Nant Cylla are high. Further investigations are proposed.

Penallta Road/Penallta Industrial Estate area:

This area is predominantly at a high to medium risk of flooding affecting highways and potentially residential and industrial properties. Flooding in this area is likely due to a blockage or the insufficient capacity of the ordinary watercourse culverts and channels. Many of the reported flood incidents refer to blocked gullies and drains. Flooding in this area is likely to be exacerbated when water levels in the Nant Cylla are high. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Gelligaer.

GELLIGAER - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
<p>Flood Forecasting, Warning & Response</p> <p>GG01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.</p>	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
<p>Studies, Assessments & Plans</p> <p>GG02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 63 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.</p>	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
<p>GG03 CCTV survey of priority culverts identified in task GG02. Capacity check of priority culverts identified in task GG02.</p>	0 – 5 (2015–2021)	£1K (< £100k)	M24	CCBC03 CCBC04
<p>GG04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.</p>	0 – 5 (2015–2021)	£2.5K (< £100k)	N/A	CCBC03
<p>GG05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.</p>	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

GELLIGAER - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
GG06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44	CCBC14
GG07 Use the outcomes from tasks GG02, GG03, GG05 and GG06 to assess the requirement for and scope of a feasibility study to reduce flooding from the Penallta Industrial Estate culvert & watercourse. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
GG08 Use the outcomes from task GG02, GG03, GG05 and GG06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area around Church Road/Oxford Road. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
GG09 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5K (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
GELLIGAER COMMUNITY AREA:****£64,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.8. Hengoed Community Area

Overview:

The Hengoed community is situated towards the west of the Caerphilly County Borough Council area and includes the town of Hengoed. It covers an area of approximately 2.1 km², the majority of which is developed with some open fields and farm land in the east of the community. Much of the existing development is residential although there is an industrial estate located at the north eastern boundary. There are also likely to be a number of small business and commercial properties and other non-residential properties and services within the town. Neighbouring communities are Penpedairheol, Tir-y-berth, Pengam, Maesycwmmmer, Ystrad Mynach and Gelligaer.

The Nant Cylla forms the western boundary of Hengoed with the River Rhymney forming the eastern boundary. Land to the west of the community drains to the Nant Cylla where the land on the east drains to the River Rhymney. There are several unnamed watercourses and local field drains shown on the Ordnance Survey mapping that drain to these larger rivers. The River Rhymney is designated as a main river and is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the River Rhymney, Nant Cylla and local watercourses.

Sources of flooding:

The information available indicates that flooding in Hengoed is not particularly extensive. The Natural Resources Wales Flood Maps indicate that flooding from the River Rhymney (main river) affects the mainly undeveloped lands adjacent to the river. Surface water flooding, while not widespread, is shown to affect some highways and the railway line, particularly in the south of Hengoed. Ordinary watercourse flooding is not particularly extensive in Hengoed. Problems may also occur in isolated locations, for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they flow through urban areas it is difficult to distinguish between surface water flooding and ordinary watercourse flooding and it is likely that they are closely linked.

Available data:

The following flood risk information is currently available for Hengoed:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps indicate a number of highways and the railway line in the south of Hengoed may be affected. Several areas are shown at high to medium risk with more extensive areas shown at low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – The information available indicates the industrial estate in the north east of Hengoed is affected by ordinary watercourse flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. No important culverts have yet been identified from the ‘Severe Weather Culvert Register’ and a desktop review, although critical structures may be identified as investigations progress.

Groundwater – Where it has been classified, the majority of Hengoed is shown to have low susceptibility to groundwater flooding, based on the underlying geology. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A number of low risk areas were identified in the south west of the community. It is important to note that once properties have been included in the DG5 register this means funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses in the north east of Hengoed where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Hengoed relate to surface water, where the local drainage system is not effective in capturing runoff. Ordinary watercourse flooding, where watercourses are culverted through urban areas, may also be a contributing factor to the flooding in Hengoed. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies or sewers. Table 65 summarises the impacts of flooding in Hengoed, based on the surface water flood map. Figure 40 shows the Flood Risk Map for Hengoed.

COUNTS FOR HENGOED COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth 0.0m</u>				
People (n) (multiplier 2.35)	5048	118	7	0
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	2148	4	0	0
Services (n)	14	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	175	9	1	3
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	2.2	0.5	0.2	0.1
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	2	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	39	3.4	0.9	2.3

Table 65: Impacts of Flooding in Hengoed - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

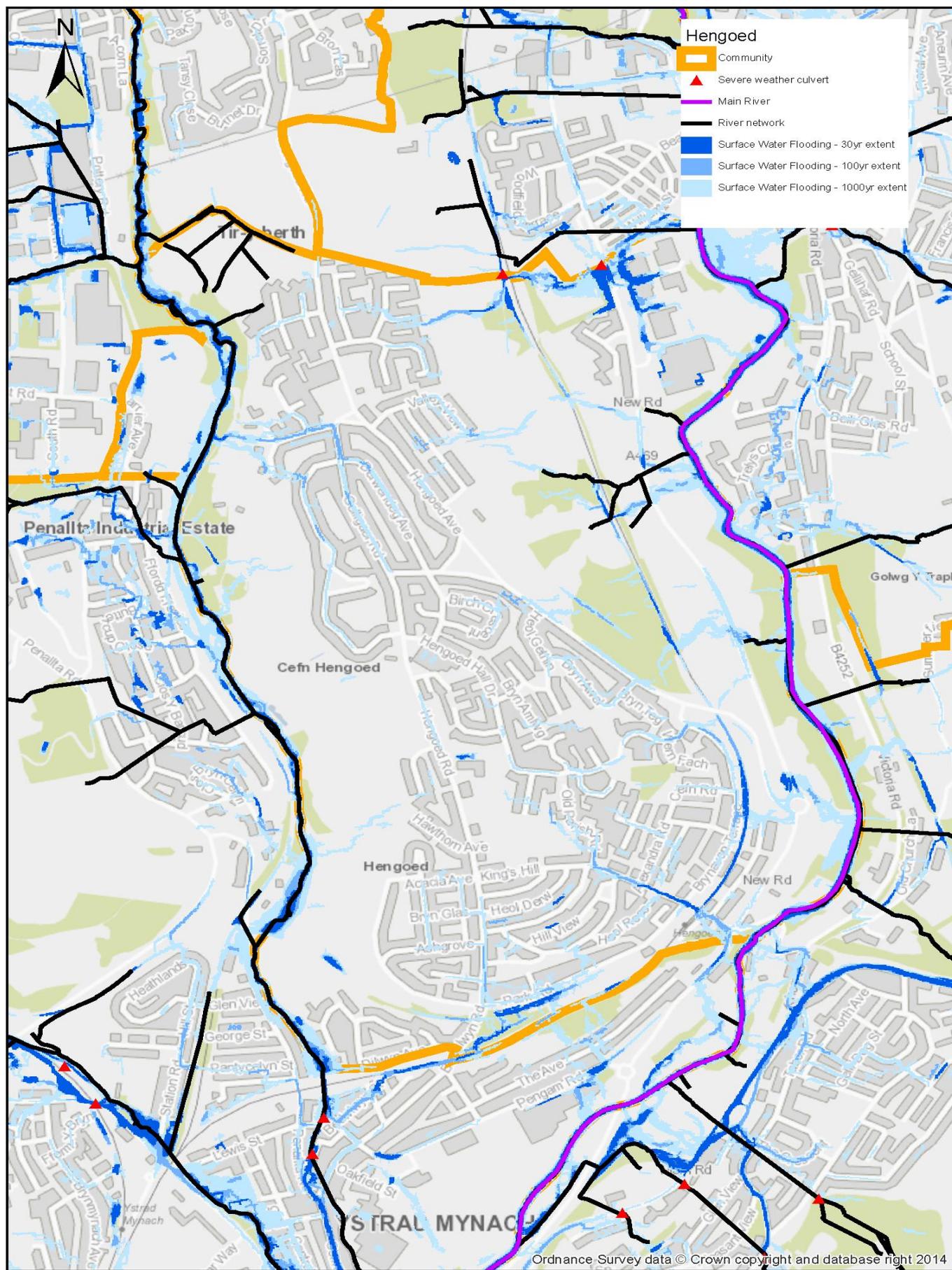


Figure 40: Flood Risk Map for Hengoed

The main flood risks have been identified as follows:***Kings Hill/Railway Line area:***

This area is generally at a high to medium risk of flooding affecting highways and the railway line. Flooding in this area is likely due to a blockage or the insufficient capacity of the local drainage network. Many of the reported flood incidents in the area relate to blocked gullies and storm sewers. Further investigations are proposed.

Industrial Estate:

This area is generally at a high risk of flooding affecting the highway and potentially industrial buildings. Flooding in this area is likely caused by a blockage or the insufficient capacity of the local drainage network and ordinary watercourse culverts adjacent to the industrial estate. A number of reported flood incidents in the area refer to blocked gullies and storm drains. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Hengoed.

HENGOED - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
<p>Flood Forecasting, Warning & Response</p> <p>HG01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.</p>	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
<p>Studies, Assessments & Plans</p> <p>HG02 <u>Site walkovers to:</u> Assess condition of culvert structures & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.</p>	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
<p>HG03 CCTV survey of priority culverts identified in task HG02. Capacity check of priority culverts identified in task HG02.</p>	0 – 5 (2015–2021)	£1K (< £100k)	M24	CCBC03 CCBC04
<p>HG04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.</p>	0 – 5 (2015–2021)	£2.5K (< £100k)	N/A	CCBC03
<p>HG05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.</p>	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

HENGOED - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
HG06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44 / M53	CCBC14
HG07 Use the outcomes from task HG02, HG03, HG05 and HG06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems and ordinary watercourses in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
HG08 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5K (all CCBC) (< £100k)	M23	CCBC25

TOTAL COST OF MEASURES FOR HENGOED COMMUNITY AREA:

£34,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



LAND DRAIN AT HENGOED

7.9. Machen Community Area

Overview:

The Machen community is situated towards the south east of the Caerphilly County Borough Council area and includes the town of Machen. It covers an area of approximately 8 km², the majority of which is open fields, farmland and woodland with the developed areas in the south of the community, adjacent to the River Rhymney. Much of the existing development is residential although there are also likely to be a number of small business and commercial properties and other non-residential properties and services. Neighbouring communities are Ynysddu, Crosskeys, Pontymister West, Rudry and Trethomas. Machen also borders the neighbouring local authority area of Newport City Council.

The River Rhymney forms the southern boundary of Machen and the majority of the area drains to the River Rhymney via a number of ordinary watercourses. The Nant y Ceisiad and Cwm Fedw along with a number of unnamed watercourses are shown on the Ordnance Survey mapping to flow in a southerly direction before joining the River Rhymney. The River Rhymney is designated a main river and is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

Main river flooding, from the River Rhymney, affects large areas of the town. The Natural Resources Wales Flood Maps indicate highways and potentially properties adjacent to the River Rhymney are at risk during larger events although flood defences are present in Machen to reduce this risk. The surface water flood maps indicate that surface water flooding, where drainage systems cannot cope with high intensity rainfall, and ordinary watercourse flooding could affect highways and properties in Machen. As many of the ordinary watercourses are culverted where they flow through urban areas it is difficult to distinguish between surface water flooding and ordinary watercourse flooding and it is likely the two are closely linked.

Available data:

The following flood risk information is currently available for Machen:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting highways and properties across the urban area of the community although generally this is close to watercourses. The majority of locations shown at risk of surface water flooding are designated low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. The areas worst affected are in the vicinity of Cae Bach, Commercial Road and Addison Way. Table 66 shows important culverts that have been identified from the 'At Risk Culvert Register'. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Addison Way.	This is a severe weather culvert. Significant flooding of the adjacent highway is shown on the surface water flood map. Numerous reported incidents of flooding due to culvert blockages.	2	Y
Ysgubor Fach Lane.	This is a severe weather culvert. Reasonable flooding is shown in the area on surface water flood map.	2	Y
Ty Canol Lane.	This is a severe weather culvert. Reasonable flooding is shown in the area on surface water flood map.	2	Y
Outside No. 1 Llyswen.	This is a severe weather culvert. Significant flooding is shown in the area. Incidents reported of flooding due to culvert blockage.	2	Y
Outside No. 14 Wesley Hill.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y
Church Street.	This is a severe weather culvert. Significant flooding is shown in the area.	2	Y

Table 66: Important Culverts - Machen

Groundwater – Where it has been classified, the majority of Machen is shown to have low susceptibility to groundwater flooding, based on the underlying geology. An area of medium susceptibility was identified in the west of Machen. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A number of low risk areas were identified in the south and south west of the community. It is important to note that once properties have been included in the DG5 register this means funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses in the south of Machen where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Machen relate to ordinary watercourse flooding, where culverts or channels may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 67 summarises the impacts of flooding in Machen, based on the surface water flood map. Figure 41 shows the Flood Risk Map for Machen.

COUNTS FOR MACHEN COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	4091	160	14	24
<u>Residential Properties at risk of internal flooding depth > 0.2m</u>				
Residential Properties (n)	1741	12	1	1
Services (n)	24	1	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	279	15	5	16
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	1.5	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	119.6	9.5	2.5	7.1
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	1	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0.2	0	0	0
Scheduled Ancient Monuments (ha)	1.4	0.1	0.1	0.1
Listed Buildings (n)	3	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	204.4	3.9	1.2	5.6

Table 67: Impacts of Flooding in Machen - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

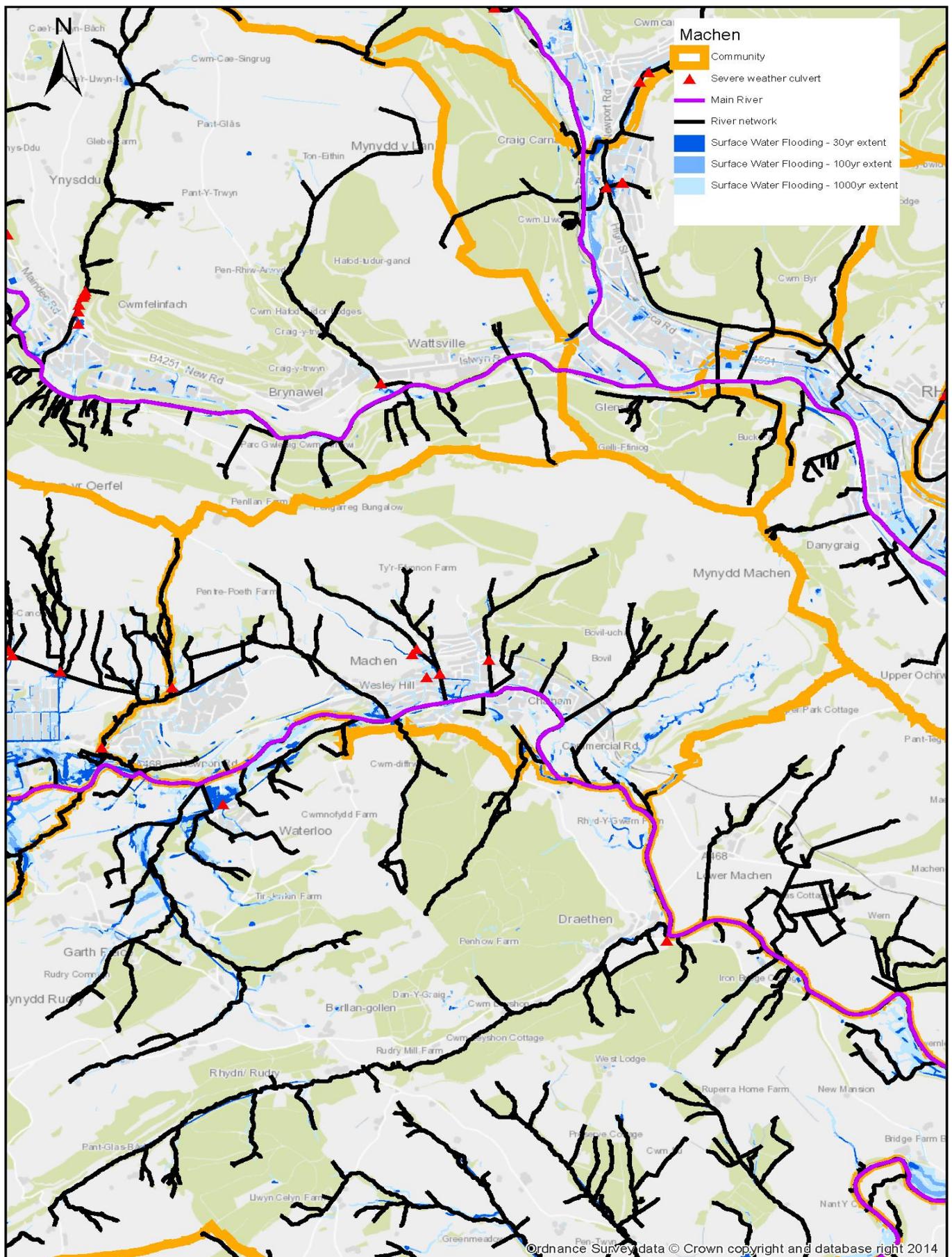


Figure 41: Flood Risk Map for Machen

The main flood risks have been identified as follows:***Addison Way area:***

This area is generally at a high to medium risk of flooding affecting highways. The surface water flood maps indicate some properties may be at risk in larger events. Flooding in this area is likely due to a combination of blockage or insufficient capacity of the ordinary watercourse and local drainage system. There are numerous reports of flooding due to the Addison Way culvert while there are also flood incidents referring to blocked gullies and storm drains. Further investigations are proposed.

Cae Bach area:

This area is predominantly at a high risk of flooding affecting highways and potentially properties. More extensive areas are shown to be at medium to low risk on the surface water flood maps. Flooding in the vicinity of Cae Bach is likely due to blockage or insufficient capacity of the local drainage system and many of the reported flood incidents relate to blocked gullies and drains. There is an ordinary watercourse flowing through this area which is also likely to be a key contributor to the flooding problems. The Natural Resources Wales Flood Maps indicate a number of properties and highways are at risk from main river flooding from the River Rhymney during larger flood events, although flood defences are present in the area to reduce this risk. Further investigations are proposed.

Commercial Road area:

This area is generally at a high to medium risk of flooding which is most likely due to a blockage or insufficient capacity of ordinary watercourse culverts and the local drainage system. The surface water flood maps indicate that flooding in this area could affect highways and a number of properties. Access to properties during large flood events may be restricted due to the extent of highway shown to be at risk. Many of the reported flood incidents in this area refer to blocked gullies and storm drains. There are also reported incidents of flooding due to culvert blockages in the area. The Natural Resources Wales Flood Maps indicate that a significant number of properties are at risk of main river flooding from the River Rhymney, although flood defences are present in the area to reduce this risk.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Machen.

MACHEN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
MH01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
MH02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 66 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
MH03 CCTV survey of priority culverts identified in task MH02. Capacity check of priority culverts identified in task MH02.	0 – 5 (2015–2021)	£2K (< £100k)	M24	CCBC04 CCBC05
MH04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5K (< £100k)	N/A	CCBC03
MH05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

MACHEN - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
MH06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44/ M53	CCBC14
MH07	Use the outcomes from tasks MH02, MH03, MH05 and MH06 to assess the requirement for and scope of a feasibility study to reduce flooding from ordinary watercourses at Addison Way, Commercial Road and Cae Bach. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£50k (3 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
MH08	Use the outcomes from task MH02, MH03, MH05 and MH06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28

MACHEN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
MH09 Assess the need for and feasibility to install trash screen/inlet monitors at key culverts.	0 – 2 (2015–2021)	£25k (5 sites, inc. installation) (<£100k)	M41 / M42	CCBC02 CCBC23
MH010 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5K (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
MACHEN COMMUNITY AREA:****£130,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.10. Manmoel Community Area

Overview:

The Manmoel community is situated towards the north east of the Caerphilly County Borough Council area and includes the village of Manmoel. It covers an area of approximately 6.9 km², and is largely open fields, farmland and woodland with the exception of Manmoel village which is located in the south east of the area. Much of the existing development is residential and there may also be some small businesses, commercial properties and services present. Neighbouring communities are Markham and Argoed. Manmoel also borders the neighbouring local authority of Blaenau Gwent County Borough Council.

The River Sirhowy forms the western boundary of Manmoel and the area generally drains in a westerly direction towards the Sirhowy. The Nant yr Ychen and Nant y Felin form the southern boundary of Manmoel and flow in a westerly direction towards the River Sirhowy. The Nant Maes-yr-onn and Nant yr Helyg flow in a westerly direction and drain the northern part of Manmoel. There are several unnamed ordinary watercourses and local field drains shown on the Ordnance Survey mapping, however it is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses. The River Sirhowy is designated main river and therefore the responsibility of Natural Resources Wales.

Sources of flooding:

The surface water flood maps indicate that there are no significant areas of flooding in Manmoel. Some isolated areas in Manmoel village are shown to be at risk of flooding during larger events due to surface water flooding, where the drainage network cannot cope with high intensity rainfall. The Natural Resources Wales Flood Maps indicate that flooding from the River Sirhowy (main river) is limited to the undeveloped lands along the western boundary and is not particularly extensive.

Available data:

The following flood risk information is currently available for Manmoel:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting the main road through Manmoel Village during larger events. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Limited flooding is shown in the vicinity of ordinary watercourses. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. There are no culverts in Manmoel identified in the 'Severe Weather Culvert Register'. Other critical structures may be identified as investigations progress.

Groundwater – Where it has been classified, Manmoel is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. No areas at risk were identified in Manmoel. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is unlikely to be any interaction with the River Sirhowy for drainage networks and ordinary watercourses given the distance from the river to Manmoel Village. The undeveloped land immediately adjacent to the River Sirhowy is shown at risk of main river flooding.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate that Manmoel is not at significant risk of flooding with limited areas in Manmoel Village at risk of surface water flooding, where the local drainage system is not effective in capturing runoff. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The low lying areas of Manmoel adjacent to the River Sirhowy are shown at risk of main river flooding in larger flood events although only undeveloped lands are shown to be at risk. Table 68 summarises the impacts of flooding in Manmoel based on the surface water flood map. Figure 42 shows the Flood Risk Map.

COUNTS FOR MANMOEL COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	82	0	0	0
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	35	0	0	0
Services (n)	0	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	73	0	0	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.2	0	0	0
Listed Buildings (n)	0	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	224.6	3.9	1.2	2.5

Table 68: Impacts of Flooding in Manmoel - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

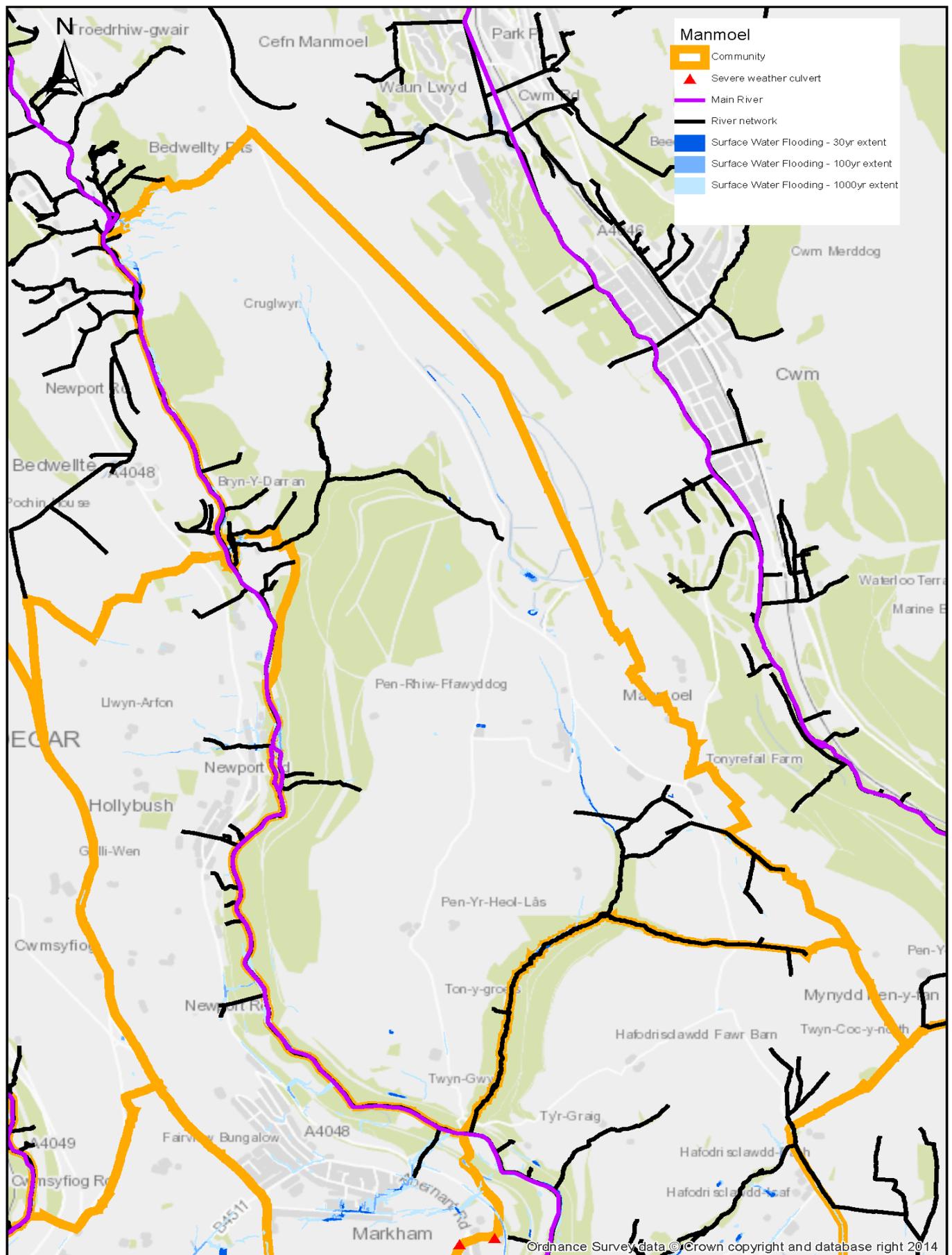


Figure 42: Flood Risk Map for Manmoel

The main flood risks have been identified as follows:***Manmoel Village:***

This area is generally at a low risk of flooding with isolated sections of the highway at medium risk. No properties are shown to be at risk on the surface water flood maps. Flooding in this area is likely to be caused by a blockage or inadequate capacity of the local drainage network and many of the reported flood incidents refer to blocked gullies and drains. No further investigations are proposed for this area.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Manmoel.

MANMOEL - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response MM01 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

**TOTAL COST OF MEASURES FOR
MANMOEL COMMUNITY AREA:**

£500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 0	Preventing 0
2 Preparing	0 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**FILTER DRAIN TO THE EDGE OF
THE CARRIAGEWAY IN MANMEOL**

7.11. Nelson Community Area

Overview:

The Nelson community is situated towards the west of the Caerphilly County Borough Council area and includes the town of Nelson. It covers an area of approximately 11 km², the majority of which is open fields and farmland with some developed land in the north of the area. The existing development is mainly residential although there are likely to be a number of small businesses and commercial properties. Neighbouring communities are Senghenydd, Ystrad Mynach and Gelligaer. Nelson also borders the neighbouring local authorities of Rhondda Cynon Taf County Borough Council and Merthyr Tydfil County Borough Council

The northern half of the Nelson area generally drains towards the Nant Mafon with the southern half draining to the Nant Cae-dudwg. The Nant Mafon flows in a westerly direction along the southern boundary of the urban area before discharging to the River Taff (main river) to the north west of Nelson. The Nant Cae-dudwg flows in a westerly direction through the southern half of Nelson before discharging to the River Taff (main river) to the west. The Nant Ddu and Nant Tirmynydd, tributaries of the Nant Cae-dudwg, flow in southerly and northerly directions respectively before joining the Nant Cae-dudwg. There are several unnamed ordinary watercourses and local field drains that drain to these rivers shown on the Ordnance Survey mapping however it is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses.

Sources of flooding:

The available data indicates that flooding from ordinary watercourses is the main source of flooding in Nelson and affects highways and potentially properties. Surface water flooding, where drainage systems cannot cope with high intensity rainfall, is less extensive but is shown to affect some highways and properties in the area. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Nelson:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);
- Drawings relating to culvert upgrade works at Llanfabon Road (2010).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across Nelson, with the main areas affected in the vicinity of Station Terrace. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of ordinary watercourses are shown at risk of flooding, particularly at Llanfabon Road, Mafon Road and Dynevor Terrace. It is likely that flooding in some of these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 69 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Heol Las 2.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	3	Y
A472 (1).	This is a severe weather culvert. Limited flooding is shown in the area on surface water flood map.	3	N
Opposite Rowan Tree Public House.	This is a severe weather culvert. Limited flooding is shown in the area on surface water flood map. Reported incident of culvert blockage.	2	Y
Wern Ganol House.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y
A472 (2).	This is a severe weather culvert. Limited flooding is shown in the area on surface water flood map.	3	N
A472 Roundabout, opposite Dynevor Terrace.	This is a severe weather culvert. Limited flooding is shown in the area on surface water flood map.	3	N
A472 opposite Trafalgar House Nursing Home.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y
Llanfabon Road 3.	This is a severe weather culvert. Significant flooding is shown in the area on the surface water flood map.	2	Y
Llanfabon Road 2.	This is a severe weather culvert. Significant flooding is shown in the area on the surface water flood map.	2	Y

Location	Comment	CCTV required (priority)	Capacity check required
Side of Treetops House, Llanfabon Road.	This is a severe weather culvert. Significant flooding is shown in the area on the surface water flood map. Reported incident of flooding due to culvert blockage.	2	Y
A472 Railway Inn Public House.	This is a severe weather culvert. Significant flooding is shown in the area on surface water flood map. Reported incident of flooding due to culvert blockage.	2	Y
A472 (3).	This is a severe weather culvert. Significant flooding is shown in the area on surface water flood map.	2	Y

Table 69: Important Culverts - Nelson

Groundwater – Where it has been classified, the majority of Nelson is shown to have low susceptibility to groundwater flooding based on the underlying geology. A small area along the north eastern boundary has been identified as having medium susceptibility. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Three areas of Nelson are identified at low risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register. No high or medium risk areas were identified in Nelson. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Nelson relate to ordinary watercourse flooding, where culverts may have restricted capacity, or surface water flooding where the local drainage system is not effective in capturing runoff. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 70 summarises the impacts of flooding in Nelson, based on the surface water flood map. Figure 43 shows the Flood Risk Map.

COUNTS FOR NELSON COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	4780	482	52	21
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	2034	42	5	5
Services (n)	20	1	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	502	67	9	3
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	3	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.9	0	0	0
Listed Buildings (n)	5	1	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	249.1	6.6	1.4	4.1

Table 70: Impacts of Flooding in Nelson – Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

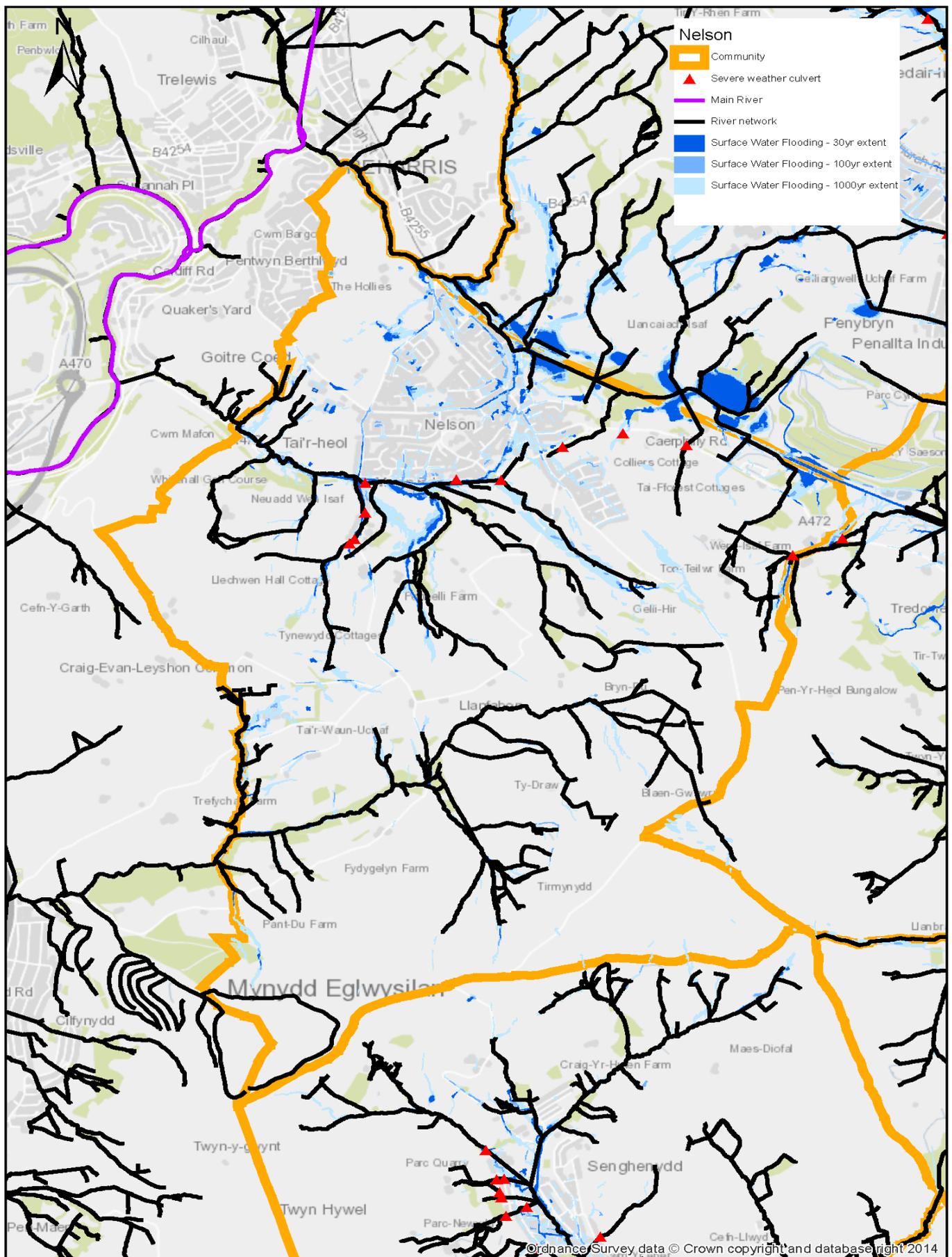


Figure 43: Flood Risk Map for Nelson

The main flood risks have been identified as follows:***Station Terrace area:***

This area is predominantly at a high to medium risk of flooding affecting local highways and potentially, properties. This is most likely to occur from a blockage or insufficient capacity of the local drainage network or flooding directly from ordinary watercourses. A number of properties are potentially shown to be at high to medium risk. Many of the reported flood incidents refer to blocked gullies and storm sewers. Further investigations are proposed.

Llanfabon Road/Mafon Road, Dynevore Terrace area:

This area is generally a high risk area with the flooding most likely due to a combination of a blockage or inadequate capacity of the local drainage network and flooding directly from the ordinary watercourses in the area. Some properties are shown to be at high to medium risk and due to the extent of flooding it is likely that access to properties will be restricted during flood events. Land drainage works including a culvert diversion are believed to have taken place here in 2010. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Nelson.

NELSON - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
NS01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
NS02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 69 and identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
NS03 CCTV survey of priority culverts identified in task NS02. Capacity check of priority culverts identified in task NS02.	0 – 5 (2015–2021)	£2K (< £100k)	M24	CCBC03 CCBC04
NS04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5K (< £100k)	N/A	CCBC03

NELSON - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
NS05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20
NS06	Complete a consultation exercise with local residents, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44 / M53	CCBC14
NS07	Use the outcomes from tasks NS02, NS03, NS05 and NS06 to assess the requirement for and scope of a feasibility study to reduce flooding from the ordinary watercourses at Station Terrace and Llanfabon Road area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£40k (2 areas) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
NS08	Use the outcomes from task NS02, NS03, NS05 and NS06 to assess the requirement for and scope of feasibility studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks (from ordinary watercourses and drainage networks); feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£35k (< £100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28

NELSON - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure		Timescale (Yrs)	Cost £	Links to Strategic Measures	
				WG, NRW & EU	CCBC
NS09	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5K (< £100k)	M23	CCBC25
NS10	Asses the requirement for and feasibility of trash screen/inlet monitors to key culverts.	0 – 2 (2015–2021)	£20k (4 sites, inc installation) (< £100k)	M41 / M42	CCBC02 CCBC23

**TOTAL COST OF MEASURES FOR
NELSON COMMUNITY AREA:****£110,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.12. New Tredegar Community Area

Overview:

The New Tredegar community is situated towards the north east of the Caerphilly County Borough Council area and includes the town of New Tredegar. It covers an area of approximately 5.3 km², which is largely open fields and farmland with some developed areas along the western boundary. Much of the existing development is residential although there are also likely to be a number of small businesses and commercial properties and other non-residential properties and services. Neighbouring communities are Abertysswg, Tir-phil, Brithdir, Aberbargoed and Markham. New Tredegar also borders the neighbouring local authority of Blaenau Gwent County Borough Council.

The River Rhymney flowing north to south forms the western boundary of New Tredegar. The New Tredegar area generally drains to the River Rhymney to the west. The Nant Syfiog, an ordinary watercourse, flows from north to south through the town of New Tredegar before joining the River Rhymney. There are a number of other ordinary watercourses flowing in a westerly direction towards the River Rhymney south of New Tredegar. The River Rhymney is designated as a main river and is therefore the responsibility of Natural Resources Wales. It is assumed developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

Main river flooding, from the River Rhymney is a significant source of flooding affecting New Tredegar. The available information indicates that flooding from the main river during larger flood events could affect a number of properties and roads in New Tredegar although defences are present to reduce this risk. Flooding from ordinary watercourses, particularly the Nant Syfiog could affect properties and access roads. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of properties and transport links in the community, although tends to be in more isolated locations and be at a lower risk.

Available data:

The following flood risk information is currently available for New Tredegar:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban areas of New Tredegar, with the main areas affected in the vicinity of White Rose Way. Several areas are shown at medium to low risk with less extensive areas at high risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly in the vicinity of Elliot’s Town. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 71 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Glyn-Syfi 1.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map.	2	Y
Glyn-Syfi 2.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map.	2	Y

Table 71: Important Culverts – New Tredegar

Groundwater – The majority of New Tredegar is shown to have low susceptibility (or is unclassified) to groundwater flooding with the exception of the north west of the area which is shown to have medium susceptibility, based on the underlying geology. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Three low risk areas were identified in the north west of New Tredegar. It is important to note that once properties have been included in the DG5 register this means funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses in the west of New Tredegar where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in New Tredegar relate to surface water flooding, where the local drainage system is not effective in capturing runoff, or ordinary watercourse flooding where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Parts of the local highways and properties are potentially at risk from the River Rhymney (main river) in larger flood events. Table 72 summarises the impacts of flooding in New Tredegar, based on the surface water flood map. Figure 44 shows the Flood Risk Map for New Tredegar.

COUNTS FOR NEW TREDEGAR COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3896	134	7	7
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	1658	27	2	1
Services (n)	11	1	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	239	8	3	5
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	4	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	165.1	2.9	0.9	3.5

Table 72: Impacts of Flooding in New Tredegar - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

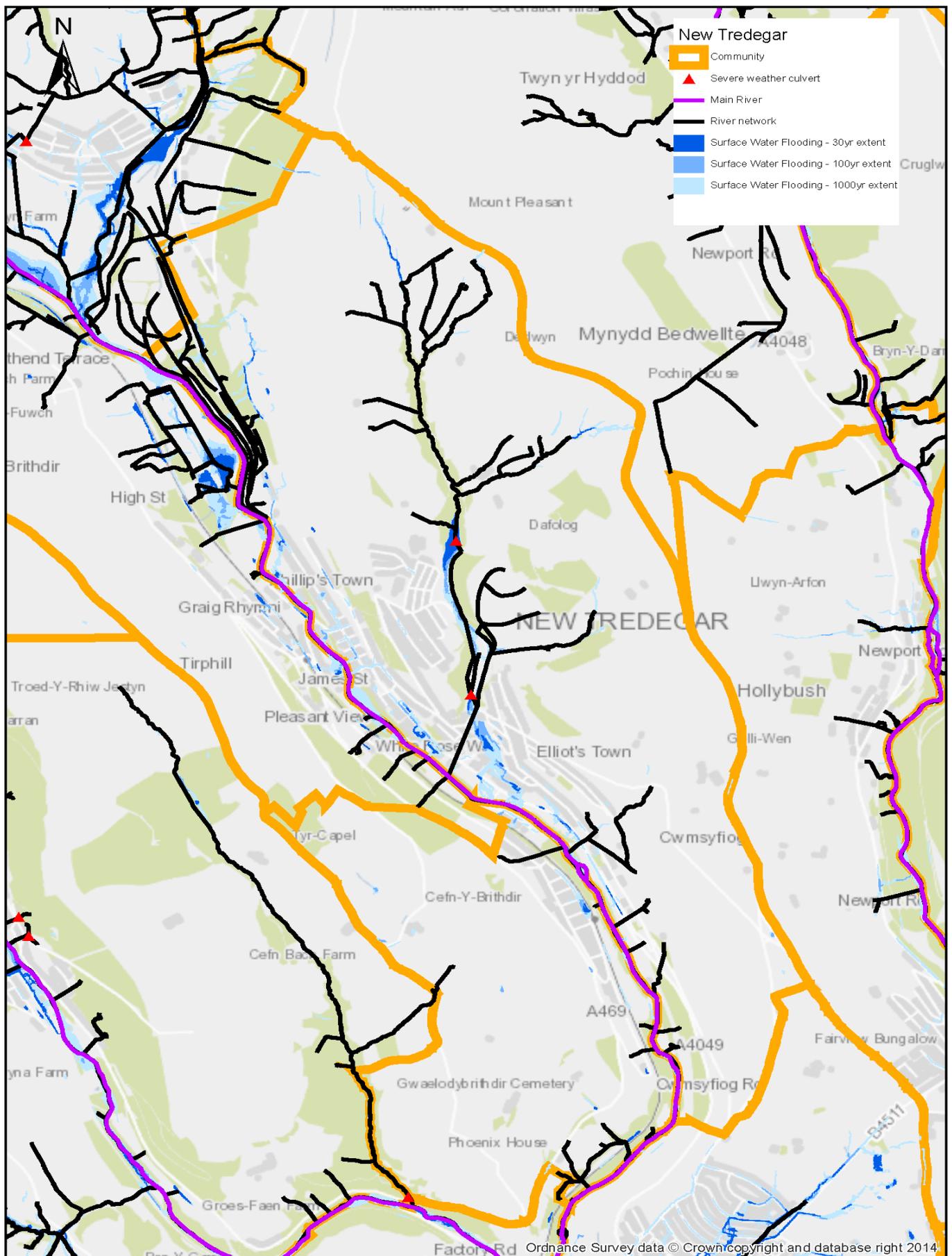


Figure 44: Flood Risk Map for New Tredegar

The main flood risks have been identified as follows:***White Rose Way area:***

This area is at a medium to high risk of flooding and is most likely due to a blockage or insufficient capacity of local drainage systems. The surface water flood map shows highways and potentially properties are at risk although there are no reported incidents. Further investigations are proposed.

Elliot's Town area:

This area is predominantly at a medium to low risk of flooding with some areas shown at high risk. This is likely due to a combination of main river, surface water and ordinary watercourse flooding. A small number of properties are shown at medium to high risk on the surface water flood maps and many of the reported flood incidents cite blocked gullies and sewers as a potential cause of flooding. The Natural Resources Wales Flood Maps show that this area is also susceptible to main river flooding during larger flood events. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for New Tredegar.

NEW TREDEGAR - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
NT01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
NT02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 71 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
NT03 CCTV survey of priority culverts identified in task NT02. Capacity check of priority culverts identified in task NT02.	0 – 5 (2015–2021)	£500 (< £100k)	M24	CCBC03 CCBC04
NT04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5K (< £100k)	N/A	CCBC03
NT05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

NEW TREDEGAR - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
NT06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44/ M53	CCBC14
NT07	Use the outcomes from task NT02, NT03, NT05 and NT06 to assess the requirement for and scope of studies to reduce flooding from the Nant Syrrog. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
NT08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5K (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
NEW TREDEGAR COMMUNITY AREA:**

£34,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
5 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



CULVERT HEADWALL AND TRASH SCREEN IN NEW TREDEGAR

7.13. Penpedairheol Community Area

Overview:

The Penpedairheol community is situated towards the west of the Caerphilly County Borough Council area and includes the town of Penpedairheol. It covers an area of approximately 2.4 km², the majority of which is open fields and farmland with the developed area of Penpedairheol located in the south of the community area. Much of the existing development is residential although there are also likely to be a number of small business and commercial properties and other non-residential properties and services. Neighbouring communities are Deri, Bargoed, Tir-y-berth, Hengoed and Gelligaer.

The Nant Cylla forms the western boundary of Penpedairheol with the Union brook forming the eastern boundary. The Nant Cascade flows in south easterly direction through the centre of the community and the land is generally drained by these three rivers. There are several unnamed watercourses and local field drains shown on the Ordnance Survey mapping that drain to the larger rivers. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the Nant Cylla, Nant Cascade and local watercourses.

Sources of flooding:

The information available indicates that ordinary watercourse flooding is the main source of flooding in the urban area of Penpedairheol. Problems may also occur for example due to culvert restrictions. Surface water flooding, where drainage networks cannot cope with high intensity rainfall, does not appear to be particularly extensive in Penpedairheol with the surface water flood maps showing few areas affected that are distant from watercourses. As many of the ordinary watercourses are culverted where they flow through urban areas, it is difficult to distinguish between surface water flooding and ordinary watercourse flooding and it is likely that they are closely linked. The Natural Resources Wales Flood Map also shows the Nant y Cylla valley is potentially at risk from a breach in the upstream embankment near Rhos-yr-yrfa. The management of flood risks associated with reservoirs is the responsibility of Natural Resources Wales.

Available data:

The following flood risk information is currently available for Penpedairheol:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);
- Drawings and a drainage study relating to a culvert upgrade scheme at Berllanlwyd Street (2009).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps indicate a number of highways and potentially properties in Penpedairheol may be affected. The area shown to be worst affected is around Farraday Drive/The Square and Bryn Siriol. These areas are shown at high to medium risk with more extensive areas shown at low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – The information available indicates that flooding from the Nant Cylla and Nant Cascade affects a number of areas in Penpedairheol with land adjacent to these watercourses worst affected. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 73 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Hospital Road.	This is a severe weather culvert. Reasonable flooding is shown in the area. Reported incident of flooding due to culvert blockage.	2	Y
1 Berllanllwyd Street.	This is a severe weather culvert. Reasonable flooding is shown in the area. Reported incident of culvert blockage. This culvert was replaced in 2009.	2	Y
Entrance to Bowling Green.	This is a severe weather culvert. Significant flooding is shown in the area.	1	Y
Rolls Avenue.	This is a severe weather culvert. Significant flooding is shown in the area.	1	Y

Table 73: Important Culverts - Penpedairheol

Groundwater – The majority of Penpedairheol is shown to have low susceptibility to groundwater flooding, based on the underlying geology. An area with medium susceptibility was identified in the west of the community. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A number of low risk areas were identified in the south of the community. It is important to note that once properties have been included in the DG5 register this means funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Penpedairheol relate to ordinary watercourse flooding, where they are culverted through urban areas. Surface water flooding, where the local drainage system is not effective in capturing runoff, is shown to affect some highways in the urban area. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 74 summarises the impacts of flooding in Penpedairheol, based on the surface water flood map. Figure 45 shows the Flood Risk Map for Penpedairheol.

COUNTS FOR PENPEDAIRHEOL COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3314	313	56	42
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Properties (n)	1410	80	10	5
Services (n)	3	1	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	116	8	0	1
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	3	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	67.8	2.1	0.6	1.4

Table 74: Impacts of Flooding in Penpedairheol – Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

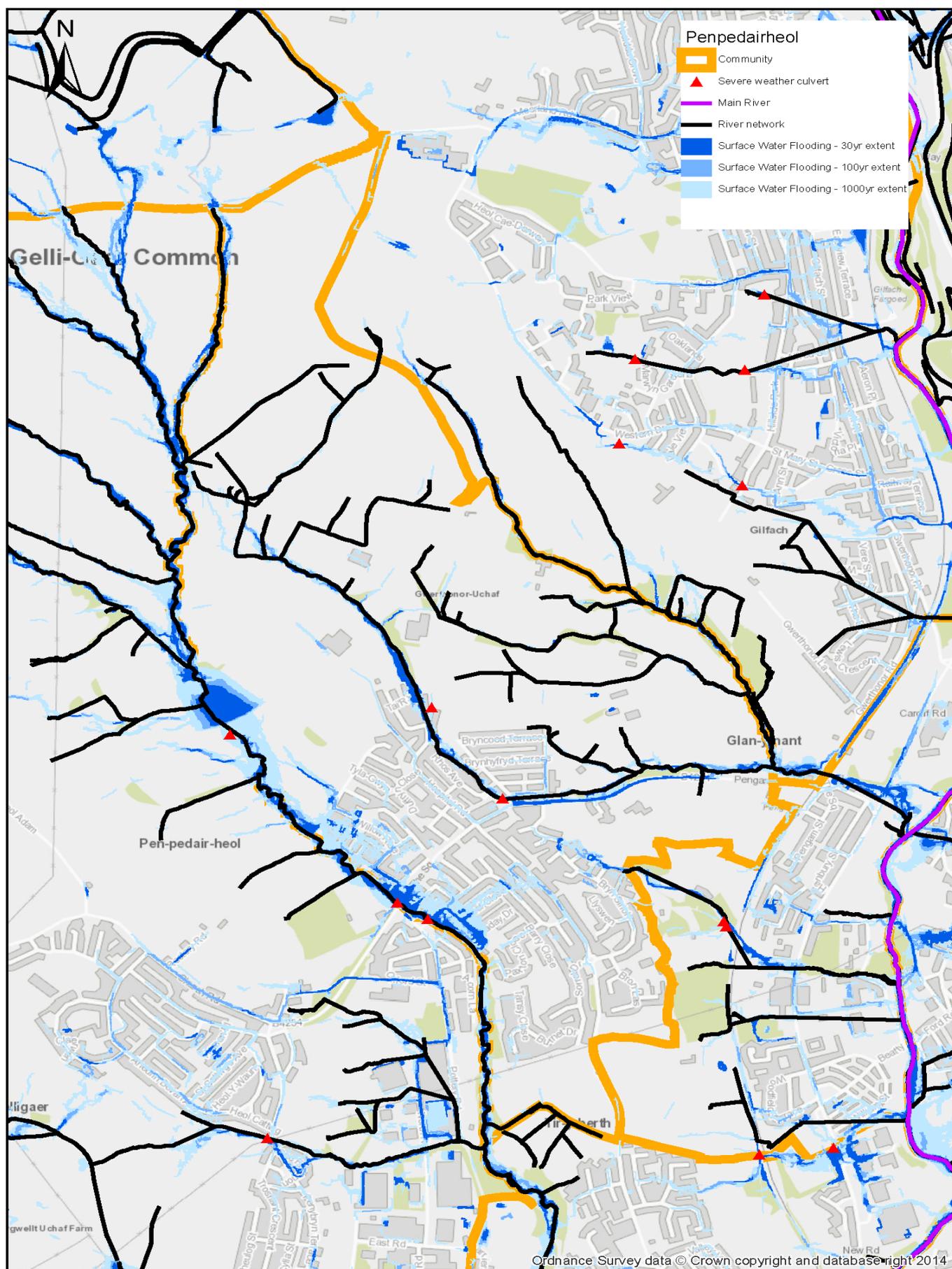


Figure 45: Flood Risk Map for Penpedairheol

The main flood risks have been identified as follows:***Nant Cylla area:***

This area is generally at a high risk of flooding affecting highways and potentially properties. Flooding in this area is likely due to blockages or insufficient capacity of the two 'at risk' culverts on the Nant Cylla which are potentially exacerbated by a general lack of channel capacity. Surface water flooding may also be contributing to the flooding in the area, particularly when water levels in the Nant Cylla are high and many of the reported flood incidents in the area refer to blocked gullies and drains. Further investigations are proposed.

Pengam Road/Tai'r-Heol area:

This area is predominantly a high risk area affecting highways and potentially properties. Flooding in this area is likely due to blockages or insufficient capacity of the culverts on the Nant Cascade ordinary watercourse. Surface water flooding may also be contributing to the flooding in the area particularly when water levels in the Nant Cascade are high and many of the reported flood incidents in the area refer to blocked gullies and drains. It is believed the culvert at Berllanllwyd Street was replaced in 2009. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Penpedairheol.

PENPEDAIRHEOL - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
PH01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
PH02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 73 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
PH03 CCTV survey of priority culverts identified in task PH02. Capacity check of priority culverts identified in task PH02.	0 – 5 (2015–2021)	£500 (< £100k)	M24	CCBC03 CCBC04
PH04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5 (< £100k)	N/A	CCBC03
PH05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (< £100k)	M42 / M44	CCBC20

PENPEDAIRHEOL - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
PH06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44 / M53	CCBC14
PH07 Use the outcomes from task PH02, PH03, PH05 and PH06 to assess the requirement for and scope of studies to reduce flooding from the Nant Cylla and Nant Cascade ordinary watercourses. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (2 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
PH08 Assess the requirement for and feasibility of installing trash screen/inlet monitors on key culverts.	0 – 2 (2015–2021)	£15k (3 sites, inc installation) (<£100k)	M41 / M42	CCBC02 CCBC23
PH09 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5 (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
PENPEDAIRHEOL COMMUNITY AREA:**

£59,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
7 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.14. Pontlottyn Community Area

Overview:

The Pontlottyn community is situated towards the north of the Caerphilly County Borough Council area and includes the south eastern fringe of Rhymney town. It covers an area of approximately 2.4km², which is largely urbanised with some open fields and farmland in the south. The majority of the existing development is residential although there is an industrial estate located in the north of the community. There is also likely to be a number of small businesses, commercial properties and other non-residential properties and services in the community. Neighbouring communities are Twyn Carno, Rhymney, Abertysswg, Tir-phil and Fochriw.

The River Rhymney forms the eastern boundary of Pontlottyn and the area generally drains to the east towards the River Rhymney. The Nant Llesg forms the northern boundary of the community and flows in an easterly direction towards the River Rhymney. The River Rhymney is designated a main river and is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses and discharge to the local watercourses.

Sources of flooding:

The available information indicates that flooding from ordinary watercourses is the main local source of flooding in Pontlottyn. As many of the watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area. The Natural Resources Wales Flood Maps indicate that the industrial estate in the north of Pontlottyn may be affected by flooding from the River Rhymney (main river) during larger events.

Available data:

The following flood risk information is currently available for Pontlottyn:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);
- Drawings relating to a culvert renewal at the Heads of the Valleys Industrial Estate (2008).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban area of Pontlottyn although these are mostly in the vicinity of drains and ordinary watercourses. The majority of these areas are shown at medium to high risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Ordinary watercourse flooding is reasonably extensive across Pontlottyn with the main areas affected in the vicinity of Capital Valley Industrial Park, Hill Road/Merchant Street, Heol Y Waun and the A469. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 75 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Mount Street.	This is a severe weather culvert. Some flooding is shown in the area on the surface water flood map. Reported incident of flooding due to culvert.	2	Y
Farm Road.	This is a severe weather culvert. Some flooding is shown in the area on the surface water flood map.	3	N
Fochriw Road.	This is a severe weather culvert. Some flooding is shown in the area on the surface water flood map.	3	N

Table 75: Important Culverts - Pontlottyn

Groundwater – The northern part of the urban area of Pontlottyn is shown to have high susceptibility to groundwater flooding with the southern part shown to have low susceptibility, based on the underlying geology. An area of very high susceptibility was identified in the north of Pontlottyn which includes part of the industrial estate. The south east of Pontlottyn is shown to have medium susceptibility to groundwater flooding. There is an old mine shaft in the area where groundwater flooding could occur as dewatering operations have ceased. There are a number of reported flood incidents in Pontlottyn that may have been caused by groundwater flooding.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Three low risk areas were identified in Pontlottyn. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There may be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Pontlottyn relate to ordinary watercourse flooding and may affect a number of areas. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. The Natural Resources Wales Flood Maps indicate main river flooding could affect the north of the community. Table 76 summarises the impacts of flooding in Pontlottyn, based on the surface water flood map. Figure 46 shows the Flood Risk Map.

COUNTS FOR PONTLOTTYN COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	2075	207	14	26
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Properties (n)	883	22	2	2
Services (n)	9	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	180	35	8	12
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	3.2	0.6	0.3	0.7
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	9	3	1	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	2	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	81.1	4.0	1.2	3.8

Table 76: Impacts of Flooding in Pontlottyn - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

The main flood risks have been identified as follows:***Hill Road/Merchant Street area:***

This area is generally at a high to medium risk of flooding with more extensive areas shown at low risk. Flooding in this area is likely due to a blockage or the insufficient capacity of the local drainage network and ordinary watercourse culverts. The surface water flood maps indicate that highways and potentially properties are affected. Groundwater flooding may also be an issue in this area as there is a reported flood incident that may have been caused by groundwater. Flooding in this area is likely to be exacerbated when water levels in the River Rhymney are high. This area is also shown to be affected by flooding from the River Rhymney (main river) during larger flood events on the Natural Resources Wales Flood Maps. Further investigations are proposed.

Capital Valley Industrial Park:

This area is generally at a high to medium risk of flooding affecting highways and potentially, industrial properties. Flooding in this area is likely to be the result of blockages or insufficient capacity of the local drainage network during high intensity rainfall and ordinary watercourse culverts. There are no reported flood incidents in the industrial estate. Surface water flooding is likely to be exacerbated when water levels in the River Rhymney are high. The Natural Resources Wales Flood Maps indicate that the industrial estate may be affected by main river flooding during larger flood events. Further investigations are proposed.

A469:

The surface water flood maps indicate the A469 is at high risk of surface water flooding north of Pontlottyn and also flooding from ordinary watercourses. This is likely due to a blockage or insufficient capacity of the local drainage network. As this is a main transport link in the north of the community and access to the industrial estate may be restricted during flood events. There are no reported flood incidents along the A469. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Pontlottyn.

PONTLOTTYN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
PT01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
PT02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 75 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
PT03 CCTV survey of priority culverts identified in task PT02. Capacity check of priority culverts identified in task PT02.	0 – 5 (2015–2021)	£1K (< £100k)	M24	CCBC03 CCBC04
PT04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5K (< £100k)	N/A	CCBC03
PT05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (<£100K)	M42 / M44	CCBC03

PONTLOTTYN - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
PT06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5K (< £100k)	M24 / M44 / M53	CCBC14
PT07 Use the outcomes from task PT02, PT03, PT05 and PT06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems and ordinary watercourses in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£45k (3 sites) (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
PT08 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5K (< £100k)	M23	CCBC25
PT09 Assess flood risks to the listed buildings and potential to incorporate measures (e.g. Property Level Protection) to reduce risks.	0 – 5 (2015–2021)	£500 (< £100k)	M23	CCBC03

**TOTAL COST OF MEASURES FOR
PONTLOTTYN COMMUNITY AREA:****£60,000**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.15. Rhymney Community Area

Overview:

The Rhymney community is situated towards the north of the Caerphilly County Borough Council area and includes the town of Rhymney. It covers an area of approximately 2.4km², which is urbanised in the west with open fields and farmland in the east. The majority of the existing development is residential although there is an industrial estate located in the west of the community, adjacent to the River Rhymney. There is also likely to be a number of small businesses, commercial properties and other non-residential properties and services in the community. Neighbouring communities are Twyn Carno, Abertysswg and Pontlottyn. Rhymney also borders the neighbouring local authority of Blaenau Gwent County Borough Council.

The River Rhymney forms the western boundary of Rhymney and the area generally drains to the west towards the River Rhymney via a number of ordinary watercourses and local field drains shown on the Ordnance Survey mapping. These watercourses are culverted where they flow through the urban areas. The River Rhymney is designated a main river and is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses.

Sources of flooding:

The available information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, and ordinary watercourse flooding are the main sources of flooding in Rhymney. As many of the watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area. The Natural Resources Wales Flood Maps indicate that the industrial estate, adjacent to the River Rhymney and the south west of the community may be affected by main river flooding during larger events.

Available data:

The following flood risk information is currently available for Rhymney:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban area of Rhymney, with the main areas affected in the vicinity of The Terrace, Beulah Street, Moriah Street and The Lawns Industrial Estate. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies and storm sewers.

Ordinary Watercourses – Several of the areas outlined above may also be at risk of ordinary watercourse flooding as the watercourses are culverted through the urban area. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 77 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Alexander Place.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Thomas Fields 1.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y
Thomas Fields 2.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map. Reported flood incidents due to culvert blockage.	2	Y
Rear of Lady Tyler Terrace.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map. Reported flood incidents due to culvert blockage.	2	Y
The Lawns Industrial Estate.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y
Hafod-y-Mynydd.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y

Table 77: Important Culverts - Rhymney

Groundwater – The south west of Rhymney is shown to have high susceptibility to groundwater flooding with the north west of the area shown to have very high susceptibility, based on the underlying geology. The south east and north east are shown to have medium and low susceptibility respectively. There are a number of old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. However, no areas at risk of sewer flooding were identified in Rhymney.

Interaction with main river – There may be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Rhymney relate to surface water flooding, where the local drainage system is not effective in capturing runoff. Flooding from ordinary watercourses is less extensive but may affect a number of areas. The Natural Resources Wales Flood Maps indicate main river flooding could affect land near to the river. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 78 summarises the impacts of flooding in Rhymney, based on the surface water flood map. Figure 47 shows the Flood Risk Map.

COUNTS FOR RHYMNEY COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3318	472	80	85
<u>Residential Properties at risk of flooding depth >0.2m</u>				
Properties (n)	1412	38	18	14
Services (n)	24	1	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	255	44	3	14
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	3	0	0	1
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	16	1	2	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	5.7	0.6	0.1	0.3

Table 78: Impacts of Flooding in Rhymney - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

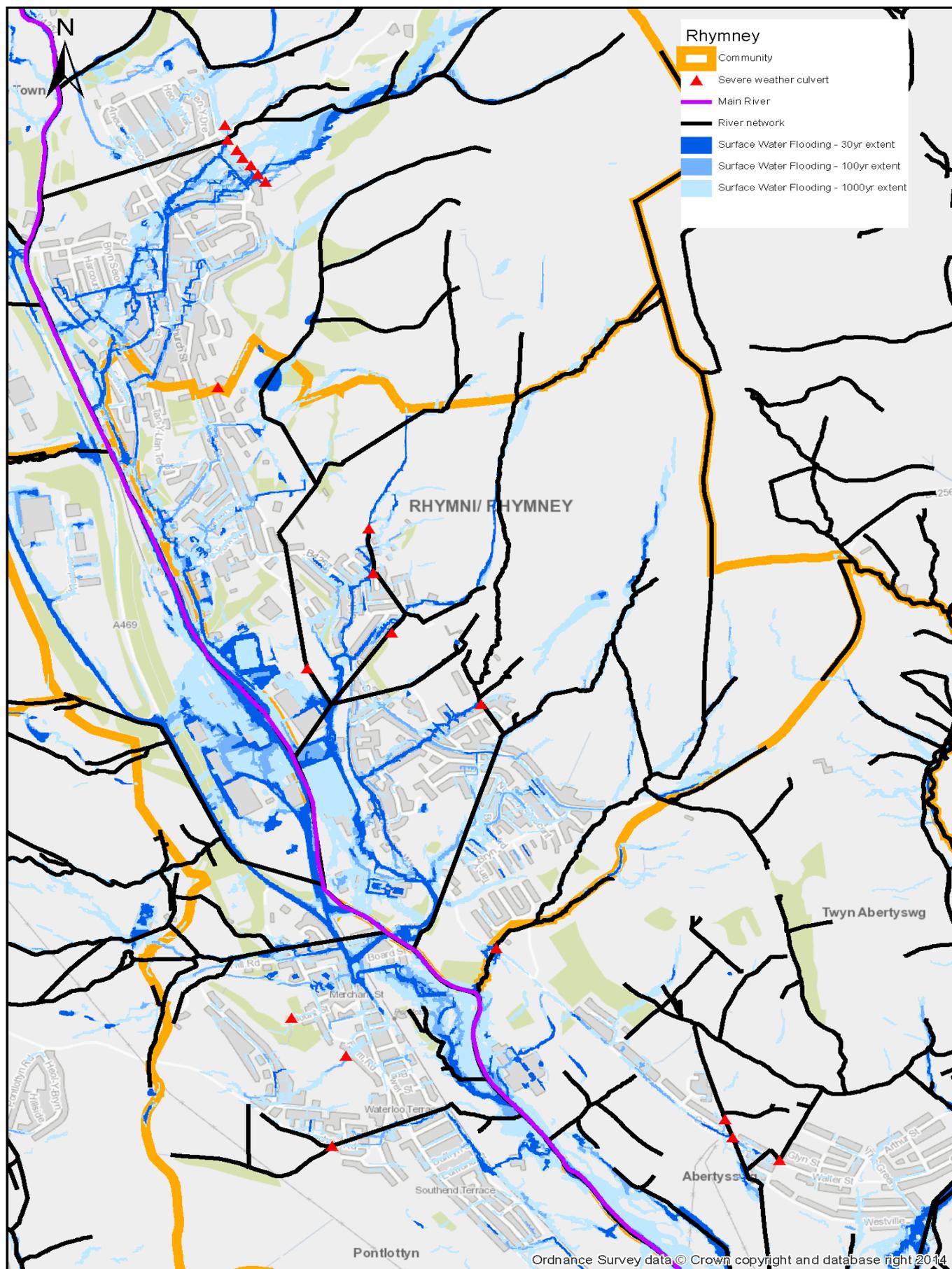


Figure 47: Flood Risk Map for Rhymney

The main flood risks have been identified as follows:***The Terrace area:***

This area is generally at a medium to low risk of flooding affecting highways and potentially, properties with more isolated locations shown to be at high risk on the surface water flood maps. Flooding in this area is likely due to a blockage or insufficient capacity of the local drainage network and ordinary watercourse culverts. Access to a number of properties in this area is likely to be restricted during larger flood events and flooding in the area may be exacerbated when water levels in the River Rhymney are high. Further investigations are proposed.

Beulah Street/the Lawns Industrial Estate area:

This area is generally at a high to medium risk of flooding with wider areas shown at low risk on the surface water flood maps. Flooding in this area is likely to be caused by a blockage or insufficient capacity of the local drainage system and ordinary watercourse culverts. There are a number of at risk culverts in the area which may contribute to the flooding and many of the reported flood incidents in the area relate to blocked gullies, sewers and culverts. Surface water/ordinary watercourse flooding is likely to be exacerbated when water levels in the River Rhymney are high. Access to a number of properties, particularly in the industrial estate is likely to be restricted during flood events. The industrial estate and lands adjacent to the River Rhymney are shown to be at risk of main river flooding on the Natural Resources Wales Flood Maps during larger flood events. Further investigations are proposed.

Moriah Street area:

This area is generally at a high to medium risk of flooding affecting highways and potentially, properties. Flooding in this area is likely due to a blockage or insufficient capacity of the local drainage network and ordinary watercourse culverts. Access to a number of properties in this area is likely to be restricted during larger flood events and flooding in the area may be exacerbated when water levels in the River Rhymney are high. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Rhymney.

RHYMNEY - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
RH01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
RH02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 77 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
RH03 CCTV survey of priority culverts identified in task RH02. Capacity check of priority culverts identified in task RH02.	0 – 5 (2015–2021)	£1k (< £100k)	M24	CCBC03 CCBC04
RH04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
RH05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (<£100K)	M42 / M44	CCBC20

RHYMNEY - SPECIFIC IMPLEMENTATION MEASURES

Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
RH06 Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC14
RH07 Use the outcomes from task RH02, RH03, RH05 and RH06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems and ordinary watercourses in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£45k (<£100k)	M24 / M33 / M34	CCBC04 CCBC05 CCBC27 CCBC28
RH08 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25
RH09 Assess the need for and feasibility of installing trash screen/culvert inlet monitors on key culverts.	0 – 2 (2015–2021)	£30k (~ 6 sites, inc installation) (< £100k)	M41 / M42	CCBC25

TOTAL COST OF MEASURES FOR RHYMNEY COMMUNITY AREA:

£89,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



REINFORCED CONCRETE DRAINAGE CHANNEL IN RHYMNEY

7.16. Rudry Community Area

Overview:

The Rudry community is situated towards the south of the Caerphilly County Borough Council area. It covers an area of approximately 23.4 km², the majority of which is open fields and woodland. The developed areas in Rudry consist of a number of individual villages and properties. Neighbouring communities are Caerphilly South, Caerphilly East, Trethomas and Machen. Rudry also borders the neighbouring local authorities of Cardiff City Council and Newport City Council.

The River Rhymney forms the northern and eastern boundary of Rudry and the majority of the area drains towards the River Rhymney. The Nant y Garth and Nant Tir Jenkins flow in a northerly direction and drain the north eastern part of the community before discharging to the River Rhymney. The Nant y Draethen flows in an easterly direction through Rudry before discharging to the River Rhymney near the village of Draethen. The south east of Rudry is drained by the Nant y Cor Fawr, Nant Du and Nant Fawr which all flow in a southerly direction. The south west of Rudry is drained by the Nant Transhryhebog which flows in a south westerly direction towards the Llanishen Reservoir located to the south of Rudry. It is assumed the developed areas are drained via the local sewer network or culverted watercourses, discharging to the larger rivers in the area. The River Rhymney is a designated main river and therefore the responsibility of Natural Resources Wales.

Sources of flooding:

Flooding from main rivers, the River Rhymney is one of the main sources of flooding affecting the Rudry community. According to the Natural Resources Wales Flood Map, this affects undeveloped land to the north and east of the community and residential areas adjacent to the River. The available information indicates flooding from ordinary watercourses is less extensive however problems may occur in more isolated locations, for example due to culvert constrictions. The information indicates that surface water flooding, where drainage systems cannot cope with high intensity rainfall, could affect a number of areas of the community.

Available data:

The following flood risk information is currently available for Rudry:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties in the village of Garth Place in the north of Rudry. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages.

Ordinary Watercourses – Flooding from ordinary watercourses generally affects undeveloped land with the exception of the village of Waterloo in the north of Rudry. The surface water flood maps indicate a number of properties and roads in Waterloo may be affected by ordinary watercourse flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 79 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Cray Valley, Waterloo.	This is a severe weather culvert. Significant flooding is shown in the area. Reported incidents of flooding due to this culvert.	2	Y
The Row, Draethen.	This is a severe weather culvert. Limited flooding is shown on the surface water flood maps.	3	Y

Table 79: Important Culverts - Rudry

Groundwater – Where it has been classified, the majority of Rudry is shown to have low susceptibility to groundwater flooding, based on the underlying geology. The east of the area is shown to be more susceptible. There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – Parts of Caerphilly were identified at high risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register, however this does not include the Rudry area.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risk in Rudry relate to ordinary watercourse flooding. Surface water flooding is not particularly extensive in Rudry but many of the areas affected are at risk from flooding from the River Rhymney. Table 80 summarises the impacts of local flooding in Rudry, based on the surface water flood map. Figure 48 shows the Flood Risk Map.

COUNTS FOR RUDRY COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	1022	68	7	2
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	435	3	0	0
Services (n)	4	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	416	7	0	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	1.1	0.2	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	1173.4	51.3	13.4	27.8
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	1	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	68.9	0.3	0.1	0
Parks and Gardens (ha)	308.1	7.7	1.8	3.3
Scheduled Ancient Monuments (ha)	4.7	0.1	0	0
Listed Buildings (n)	26	0	0	0
Licensed Abstractions (LA) (n)	3	1	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	691.2	4.8	4.5	16.2

Table 80: Impacts of Flooding in Rudry - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

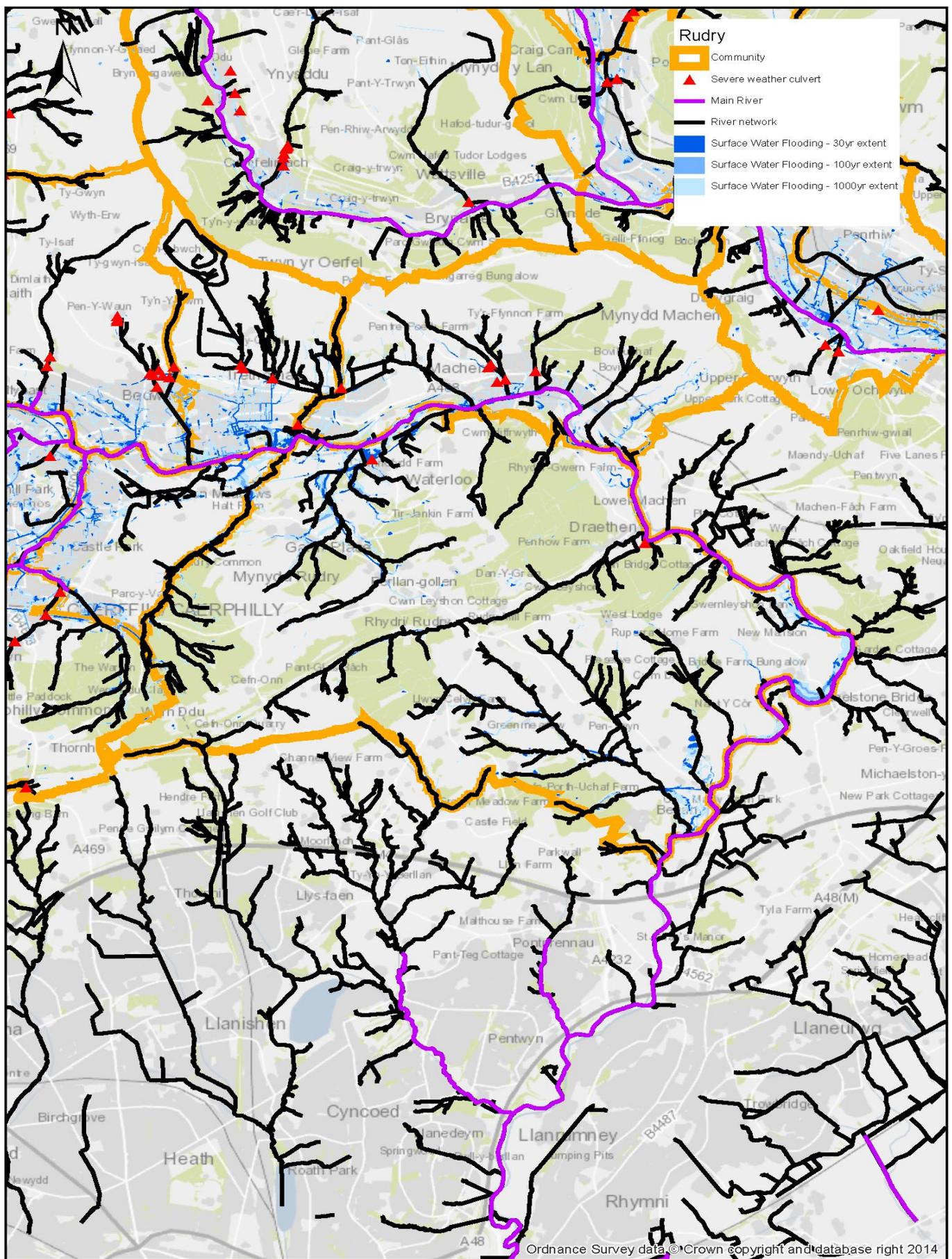


Figure 48: Flood Risk Map for Rudry

The main flood risks have been identified as follows:***Waterloo village:***

This area is generally at a high to medium risk of flooding potentially affecting a number of properties and access. This is most likely to occur from overland flows from the Nant Tir Jenkins the blockage or under-capacity of the Cray Valley culvert, or the capacity of the local drainage network. Further investigations are proposed.

Garth Place village:

This is a medium to high risk area of flooding potentially affecting roads and residential properties. This is most likely to occur due to a blockage or under-capacity of the local drainage network. Further investigations area proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Rudry.

RUDRY - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
RD01 Community Flood Plan – Investigate and establish local flood action groups to monitor & assist with debris clearance	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
RD02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 79 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
RD03 CCTV survey of priority culverts identified in task RD02. Capacity check of priority culverts identified in task RD02.	0 – 5	£500 (< £100k)	M24	CCBC03 CCBC04
RD04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
RD05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (<£100K)	M42 / M44	CCBC20

RUDRY - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
RD06 Undertake a local community consultation exercise to improve understanding of flooding issues, causes and impacts and inform response plans.	0 – 2 (2015–2021)	£2.5k (<£100k)	M24 / M44 / M53	CCBC14
RD07 Use the outcomes from tasks RD02, RD03, RD05 and RD06 to assess the requirement for and feasibility of installing trash screen/inlet monitors at key culverts.	0 – 2 (2015–2021)	£10k (~ 2 sites, inc installation) (<£100k)	M41 / M42	CCBC02 CCBC23
RD08 Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (flood depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
RUDRY COMMUNITY AREA:**

£24,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 4
7 Preparing	0 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



BESPOKE INTAKE STRUCTURE

7.17. Senghenydd Community Area

Overview:

The Senghenydd community is situated towards the south west of the Caerphilly County Borough Council area and includes the town of Senghenydd. It covers an area of approximately 7.2 km², the majority of which is open fields and farmland with some developed land adjacent to the Nant Cwm-parc in the centre of Senghenydd. The existing development is mainly residential although there are likely to be a number of small businesses and commercial properties. Neighbouring communities are Nelson, Ystrad Mynach, Llanbradach and Abertridwr. Senghenydd also borders the neighbouring local authority of Rhondda Cynon Taf County Borough Council.

The Senghenydd area generally drains towards the Nant Cwm-parc which flows in a southerly direction through the centre of the community. The Nant Cae'r-moel, a tributary of the Nant Cwm-parc drains the north western section of the community. The Nant Cwmceffyl drains the eastern part of Senghenydd and flows in a southerly direction before joining the Nant yr Aber in the neighbouring Abertridwr community to the south of Senghenydd. There are several unnamed ordinary watercourses and local field drains that drain to these rivers shown on Ordnance Survey mapping, however it is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses.

Sources of flooding:

The available data indicates that flooding from ordinary watercourses and surface water flooding, where drainage systems cannot cope with high intensity rainfall, are the main sources of flooding in Senghenydd and affects highways and potentially properties. Problems may also occur in more isolated locations for example due to culvert restrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Senghenydd:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across Senghenydd, with the main areas affected in the vicinity of Parc Terrace and Gwern Avenue. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of ordinary watercourses are shown at risk of flooding. It is likely that flooding in some of these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 81 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Senghenydd Sawmills.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Rear of 38 Grove Terrace.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	2	Y
Nant-Y-Parc Junior School.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	Y
Grove Terrace 3.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Grove Terrace 2.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Grove Terrace 1.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map. Reported incident of debris in culvert.	3	Y
Plas Cwm Park.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map. Reported incident of culvert blockage.	2	Y
Side of 41 Station Terrace.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map.	3	N
Rear of Clive House.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map. Reported incident of culvert blockage.	3	Y
Rear of 95 Caerphilly Rd.	This is a severe weather culvert. Limited flooding is shown in the area on the surface water flood map. Reported incident of flooding due to culvert blockage.	3	Y
Rear of Windsor Hotel.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	3	Y

Table 81: Important Culverts – Senghenydd

Groundwater – Where it has been classified, the majority of Senghenydd is shown to have low susceptibility to groundwater flooding based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – One area of Senghenydd was identified at low risk of sewer flooding in the Preliminary Flood Risk Assessment, based on the DG5 incidents register. No high or medium risk areas were identified in Senghenydd. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Senghenydd relate to ordinary watercourse flooding, where culverts may have restricted capacity, or surface water flooding, where the local drainage system is not effective in capturing runoff. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 82 summarises the impacts of flooding in Senghenydd, based on the surface water flood map. Figure 49 shows the Flood Risk Map.

COUNTS FOR SENGHENYDD COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3095	263	28	28
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	1317	28	3	5
Services (n)	13	1	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	198	30	6	10
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.9	0	0	0
Listed Buildings (n)	2	0	1	0
Licensed Abstractions (LA) (n)	1	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	193.7	3.0	0.8	0.9

Table 82: Impacts of Flooding in Senghenydd - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

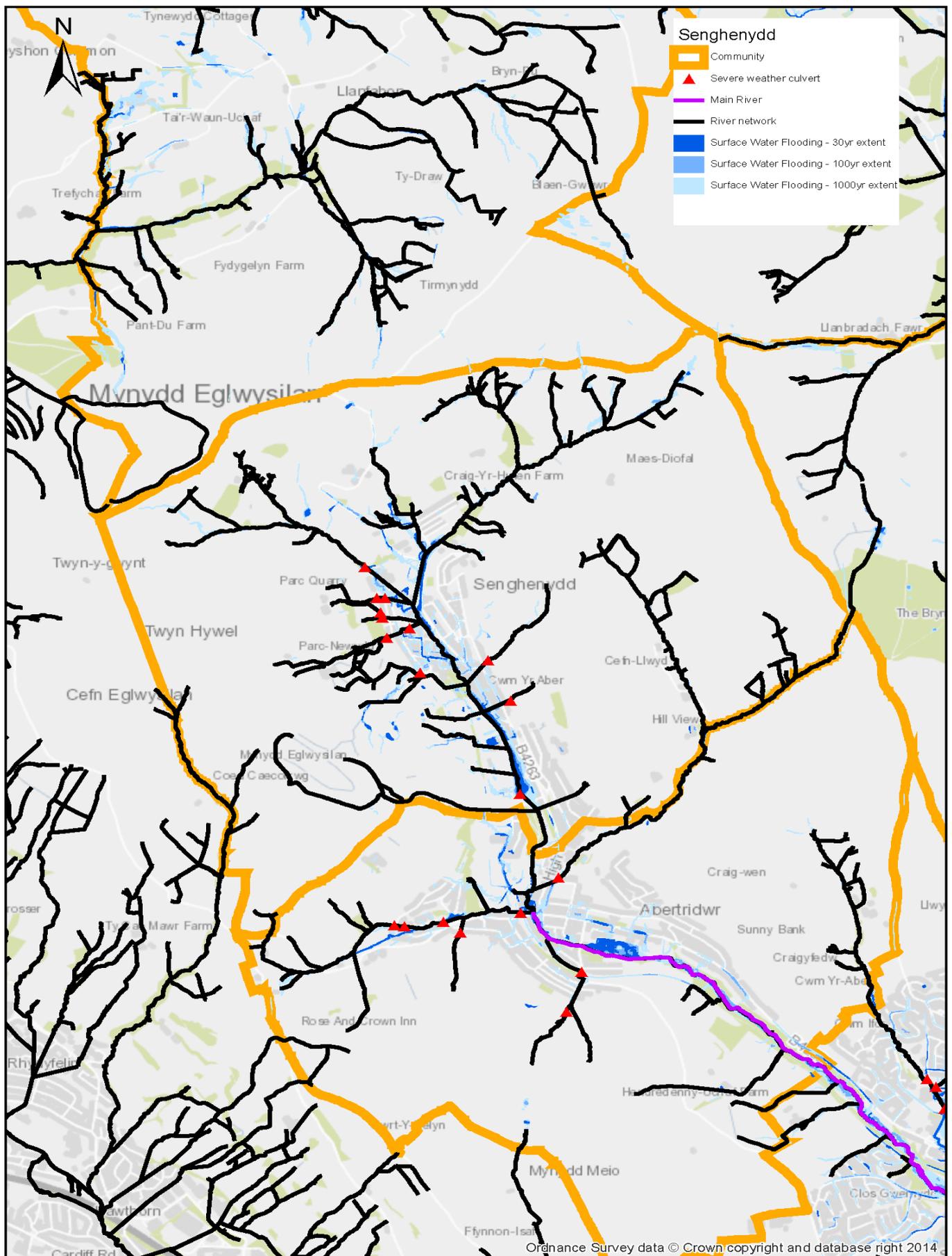


Figure 49: Flood Risk Map for Senghenydd

The main flood risks have been identified as follows:

Parc Terrace/Gwern Avenue area/Station Terrace area:

This area is predominantly at a high to medium risk of flooding affecting local highways and potentially properties. This is most likely to occur from a blockage or insufficient capacity of the local drainage network or flooding directly from ordinary watercourses. Many of the reported flood incidents refer to blocked gullies and storm sewers. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Senghenydd.

SENGHENYDD - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
SH01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
SH02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 81 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
SH03 CCTV survey of priority culverts identified in task SH02. Capacity check of priority culverts identified in task SH02.	0 – 5 (2015–2021)	£2k (< £100k)	M24	CCBC03 CCBC04
SH04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
SH05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues	Ongoing	£500 (<£100K)	M42 / M44	CCBC20

SENGHENYDD - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
SH06	Complete a consultation exercise with local residents, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC14
SH07	Use the outcomes from task SH02, SH03, SH05 and SH06 to assess the requirement for and scope of feasibility studies to reduce flooding from ordinary watercourses in the vicinity of Parc Terrace and Gwern Avenue. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks (from ordinary watercourses and drainage networks); feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (< £100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
SH08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
SENGHENYDD COMMUNITY AREA:****£45,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
5 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.18. Tir-phil Community Area

Overview:

The Tir-phil community is situated towards the north of the Caerphilly County Borough Council area and includes the western fringe of the town of New Tredegar. It covers an area of approximately 2.3 km², which is largely open fields and farmland with development situated along the south eastern fringe. Much of the existing development is residential and there is also likely to be a number of small businesses and commercial properties and services. Neighbouring communities are Pontlottyn, Abertysswg, New Tredegar, Brithdir, Deri and Fochriw.

The River Rhymney forms the eastern boundary of the community and the majority of the area drains in an easterly direction towards the River Rhymney. Ordnance Survey mapping shows a number of ordinary watercourses and field drains draining to the River Rhymney. There are two ponds adjacent to the River Rhymney in the north of the community. The River Rhymney is designated a main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

The Natural Resources Wales Flood Map indicates that a number of properties could be affected by flooding from the River Rhymney (main river) although defences are present which reduce this risk. The surface water flood maps indicate that surface water flooding, where drainage systems cannot cope with high intensity rainfall, and flooding from ordinary watercourses is not particularly extensive in Tir-phil. Problems may occur in more isolated locations for example due to culvert restrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Tir-phil:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps indicate that surface water flooding is not particularly extensive in Tir-phil with a small number of highways and the gardens of a number of houses are shown to be affected. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – The available information indicates that flooding in Tir-phil due to ordinary watercourses is not a significant issue. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. There are no culverts in Tir-phil identified in the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Groundwater – Where it has been classified, Tir-phil is shown to have low susceptibility to groundwater flooding based on the underlying geology. The east of Tir-phil, to the north of the developed area, is shown to have medium susceptibility to groundwater flooding. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. Two low risk areas were identified in Tir-phil. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels. The undeveloped land immediately adjacent to the River Rhymney is shown at risk of main river flooding.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risk in Tir-phil relates to main river flooding from the River Rhymney. The Natural Resources Wales Flood Maps indicate a number of properties may be at risk. Surface water flooding and flooding from ordinary watercourses is not particularly extensive and may only affect a small number of areas. Table 83 summarises the impacts of flooding in Tir-phil based on the surface water flood map. Figure 50 shows the Flood Risk Map.

COUNTS FOR TIR-PHIL COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	649	5	0	0
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	276	0	0	0
Services (n)	1	0	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	51	2	0	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	3.5	0.1	0.1	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	0	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	47.8	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	0	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	52.2	2.4	0.9	2.8

Table 83: Impacts of Flooding in Tirphil - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

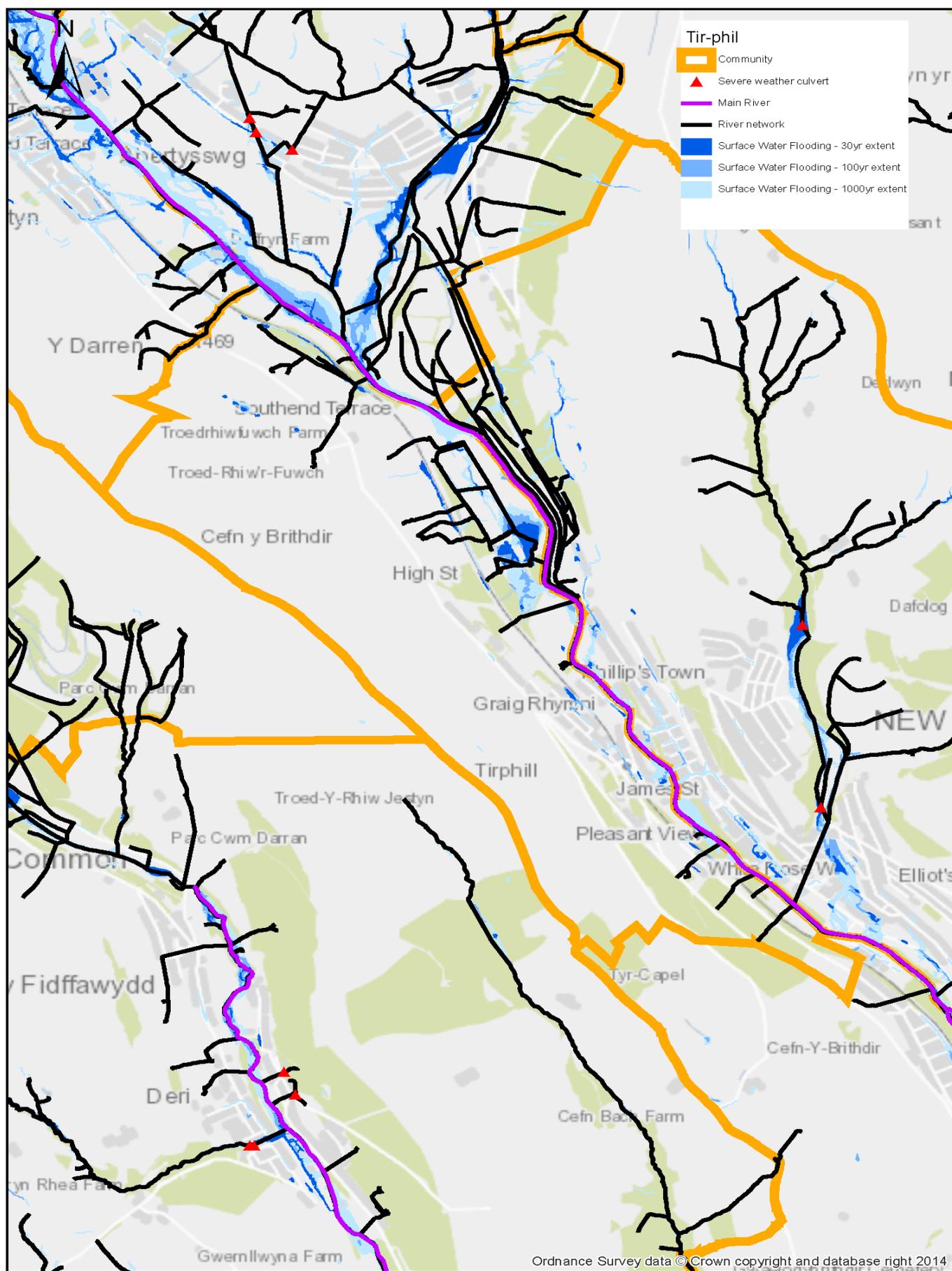


Figure 50: Flood Risk Map for Tirphil

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Tirphil.

TIR-PHIL - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
TP01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
TP02 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (<£100K)	M42 / M44	CCBC20

**TOTAL COST OF MEASURES FOR
TIR-PHIL COMMUNITY AREA:****£5,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 0	Preventing 0
4 Preparing	0 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.19. Tir-y-berth Community Area

Overview:

The Tir-y-berth community is situated towards the north west of the Caerphilly County Borough Council area and includes the towns of Tir-y-berth and Glan-y-nant. It covers an area of approximately 0.9km², which is largely developed with some open fields and farmland in the west. Much of the existing development is residential although there are also likely to be a number of small businesses and commercial properties and services. Neighbouring communities are Bargoed, Penpedairheol, Hengoed and Pengam.

The River Rhymney forms the eastern boundary of the community and Tir-y-berth generally drains in an easterly direction towards the river. The Nant y Cascade flows in an easterly direction through the northern part of the community before discharging to the River Rhymney and appears to be culverted for most of its length in Tir-y-berth. Three other un-named watercourses are shown on the Ordnance Survey mapping which flow through the urban areas before joining the River Rhymney. The River Rhymney is designated main river and therefore is the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses and River Rhymney.

Sources of flooding:

The available data indicates flooding from ordinary watercourses is one of the main sources of flooding in Tir-y-berth with problems may occurring for example due to culvert constrictions. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The available information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area, with significant risks in some areas. Main river flooding is not particularly extensive with the Natural Resources Wales Flood Maps indicating that some undeveloped lands in the east of Tir-y-berth may be affected during larger flood events.

Available data:

The following flood risk information is currently available for Tir-y-berth:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban areas of the Tir-y-berth, with the main areas affected in the vicinity of Cardiff Road, Pwll Yr Allt and William Street. Several areas are shown at high risk with wider areas shown at medium to low risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies or drains.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly at Cardiff Road where the Nant y Cascade is culverted, and William Street. It is likely that flooding in these areas would be due to a combination of surface water and fluvial flooding. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 84 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’ and a desktop review. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Pengam Road, downstream face of railway.	High risk flow path is shown on the surface water flood map. Incidents reported in the vicinity.	2	Y
Pengam Road.	High risk flow path is shown on the surface water flood map. Incidents reported in the vicinity.	1/2	Y
Rear Woodfield Terrace.	Limited flow path is shown on the surface water flood map. Blockage incident reported.	2	Y
Cwm-Yr-Allt Lane, off New Road, Glan-y-Nant.	This is a severe weather culvert. Reasonable flow path is shown on the surface water flood map.	3 (short culvert)	N
Cwm-yr-Allt Lane.	This is a severe weather culvert. Reasonable flow path is shown on the surface water flood map.	3 (short culvert)	N
Woodfield Terrace (railway).	This is a severe weather culvert. Reasonable flow path is shown on the surface water flood map. Reported blockage incident in the vicinity.	3 (short culvert)	Y
New Road, Tir-y-berth.	This is a severe weather culvert. Watercourse is not shown on map but surface water flooding is shown in the vicinity.	3	Y

Table 84: Important Culverts – Tir-y-berth

Groundwater – The majority of Tir-y-berth is shown to have low susceptibility to groundwater flooding, based on the underlying geology (or is unclassified). There are several old coal mine shafts which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. A number of low risk areas were identified in Tir-y-berth. No high or medium risk areas were identified. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Tir-y-berth relate to surface water flooding, where the local drainage system is not effective in capturing runoff, or ordinary watercourses where culverts may have restricted capacity. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Some undeveloped lands in the east of Tir-y-berth are shown at risk from the River Rhymney (main river) in larger flood events. Table 85 summarises the impacts of flooding in Tir-y-berth, based on the surface water flood map. Figure 51 shows the Flood Risk Map

COUNTS FOR TIR-Y-BERTH COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	1476	110	5	33
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	628	8	7	5
Services (n)	10	0	1	0
Risk to Economic Activity				
Non-Residential Properties (n)	104	3	2	0
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	1.5	0.3	0.1	0.2
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	3	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0	0	0	0
Listed Buildings (n)	2	0	0	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	11.8	0.7	0.3	1.1

Table 85: Impacts of Flooding in Tir-y-berth - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

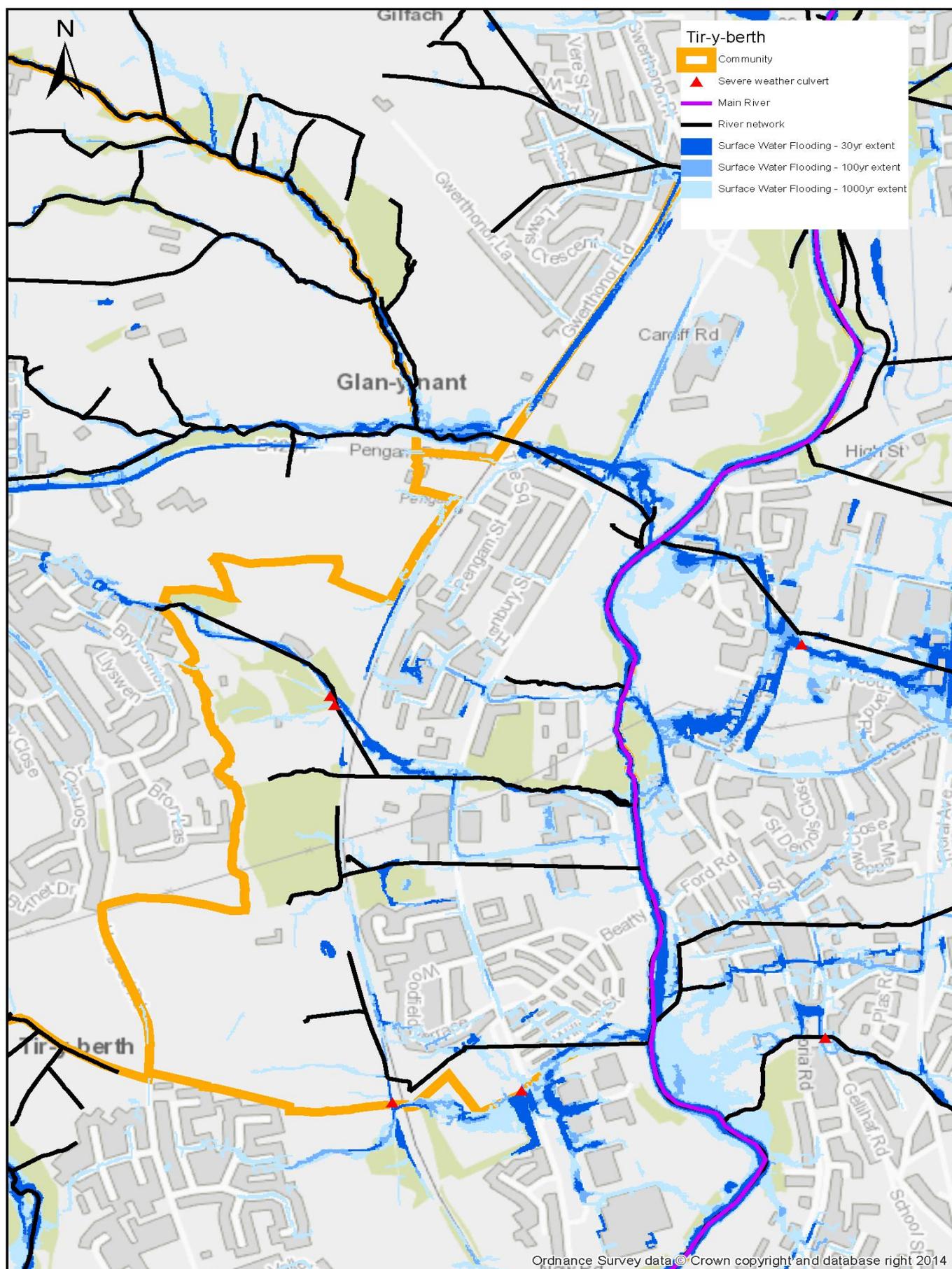


Figure 51: Flood Risk Map for Tir-y-berth

The main flood risks have been identified as follows:***Cardiff Road/Pengam Road area:***

This area is predominantly at high risk of flooding with wider areas shown at medium to low risk. This is most likely due to a blockage or the capacity of the ordinary watercourse culverts and local drainage system. A limited number of properties are shown at high risk on the surface water flood maps. Many of the reported flood incidents in this area refer to blocked gullies and sewers as contributing to the flooding. Further investigations are proposed.

Pwll-Yr-Allt area:

This area is predominantly at a medium risk of flooding with wider areas shown at low risk. This is likely due to a blockage or the capacity of the local drainage system. The surface water flood maps show a small number of properties at risk in this area. Flooding from the ordinary watercourse in this area mainly affects undeveloped lands. Further investigations are proposed.

William Street area:

This area is generally at a medium to low risk of flooding affecting highways and potentially properties. Some sections of highway are shown at high risk. Flooding in this area is likely to be due to a blockage or the capacity of the ordinary watercourse culvert and local drainage network. Many of the reported flood incidents refer to blocked gullies and storm sewers. Further investigations are proposed.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Tir-y-berth.

TIR-Y-BERTH - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
TB01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
TB02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 84 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
TB03 CCTV survey of priority culverts identified in task TB02. Capacity check of priority culverts identified in task TB02.	0 – 5 (2015–2021)	£2.0k (< £100k)	M24	CCBC04 CCBC05
TB04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03
TB05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (<£100K)	M42 / M44	CCBC20

TIR-Y-BERTH - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
TB06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC14
TB07	Use the outcomes from task TB02, TB03, TB05 and TB06 to assess the requirement for and scope of feasibility studies to reduce flooding from the Nant y Cascade. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks (from ordinary watercourses and drainage networks); feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£15k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
TB08	Use the outcomes from task TB02, TB03, TB05 and TB06 to assess the requirement for and scope of studies to reduce flooding from local drainage systems in the urban area. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£30k (<£100k)	M24 / M34	CCBC04 CCBC05 CCBC27 CCBC28
TB09	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
TIR-Y-BERTH COMMUNITY AREA:****£60,500**

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
5 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY

7.20. Twyn Carno Community Area

Overview:

The Twyn Carno community is situated at the northern extent of the Caerphilly County Borough Council area and includes the northern fringe of the town of Rhymney. It covers an area of approximately 13.8km², the majority of which is open fields and farmland with developed areas in the south adjacent to the River Rhymney. Much of the existing development is residential although there is an industrial estate located in the south of the community. There is also likely to be a number of small businesses, commercial properties and other non-residential properties and services in the community. Neighbouring communities are Rhymney and Fochriw. Twyn Carno also borders the neighbouring local authorities of Powys County Council, Blaenau Gwent County Borough Council and Merthyr Tydfil County Borough Council.

The River Rhymney flows in a southerly direction through the centre of Twyn Carno and the majority of the area drains towards the River Rhymney via a number of ordinary watercourses and local field drains shown on Ordnance Survey mapping. The Nant y Gaseg and Nant Melyn flow in a south westerly direction and drain the eastern part of Twyn Carno before joining the River Rhymney. The Nant Pitwellt and Nant Carno flow through the western part of Twyn Carno in an easterly direction. There are a number of lakes and reservoirs present in the north and east of the community. The River Rhymney is designated a main river for a section of its length in Twyn Carno (south of the A465) and is therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the local watercourses. There are also several ponds/reservoirs in the northern part of the community.

Sources of flooding:

The available information indicates that surface water flooding and flooding from ordinary watercourses, where drainage systems and culverts cannot cope with high intensity rainfall, is the main source of flooding in the urban areas of Twyn Carno. As many of the watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses. The information suggests surface water/ordinary watercourse flooding could affect properties and highways across the urban area. The Natural Resources Wales Flood Maps indicate that areas of Twyn Carno could be affected by flooding from the River Rhymney, although this is generally limited to the undeveloped lands adjacent to the river with only a small number of properties shown to be affected. The Natural Resources Wales Flood Maps also show some areas along the river valleys potentially at risk of flooding from reservoir dam breach. Natural Resources Wales is responsible for managing reservoir flood risk.

Available data:

The following flood risk information is currently available for Twyn Carno:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding potentially affecting roads and properties across the urban area of Twyn Carno, with the main areas affected in the vicinity of Oakland Terrace/Upper High Street/Ty Coch, Pen-y-Dre, Heads of the Valleys Industrial Estate, and the A465. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies and storm sewers.

Ordinary Watercourses – Ordinary watercourse flooding potentially affects similar areas to those highlighted above, particularly Oakland Terrace/Upper High Street/Ty Coch, Heads of the Valleys Industrial Estate, the A465 and land adjacent to the River Rhymney north of the A465. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Where watercourses are culverted through the urban areas it is likely that flooding from watercourses and flooding from surface water drainage systems is closely related. Table 86 shows important culverts that have been identified from the ‘Severe Weather Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Susannah Row.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	1	Y
Ty Coch Street.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	1	Y
Ty Coch Lane 1.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	1	Y
Ty Coch Lane 2.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	1	Y
Ty Coch Lane 3.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	1	Y
Ty Coch Lane 4.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	1	Y
Ty Coch Lane 5.	This is a severe weather culvert. Reasonable flooding is shown in the area on the surface water flood map.	1	Y

Table 86: Important Culverts – Twyn Carno

Groundwater – Where it has been classified, the majority of Twyn Carno is shown to have low to medium susceptibility to groundwater flooding, based on the underlying geology. An area of high susceptibility has been identified in the urban area to the east of the River Rhymney. There are a number of old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – The Preliminary Flood Risk Assessment identified areas at risk of sewer flooding, based on the DG5 incidents register. However, no areas at risk of sewer flooding were identified in Twyn Carno.

Interaction with main river – There may be some interaction with the River Rhymney for drainage networks and ordinary watercourses where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Twyn Carno relate to ordinary watercourses and surface water flooding, where the local drainage system is not effective in capturing runoff or due to blockage or restricted capacity of culverts. The Natural Resources Wales Flood Maps indicate main river flooding could affect a small number of properties adjacent to the River Rhymney. Information from the reported flood incidents indicate this is often due to (or exacerbated by) blocked gullies, sewers or culverts. Table 87 summarises the impacts of flooding in Twyn Carno, based on the surface water flood map. Figure 52 shows the Flood Risk Map.

COUNTS FOR TWYN CARNO COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
Residents <u>areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	2658	341	82	61
Residential Properties <u>at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	1131	50	6	4
Services (n)	13	0	0	1
Risk to Economic Activity				
Non-Residential Properties (n)	274	28	8	10
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	8.8	2.45	1.01	1.45
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	2	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0.1	0	0	0
Parks and Gardens (ha)	0	0	0	0
Scheduled Ancient Monuments (ha)	0.1	0	0	0
Listed Buildings (n)	8	0	0	0
Licensed Abstractions (LA) (n)	4	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	573.7	28.0	4.2	15.1

Table 87: Impacts of Flooding in Twyn Carno - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

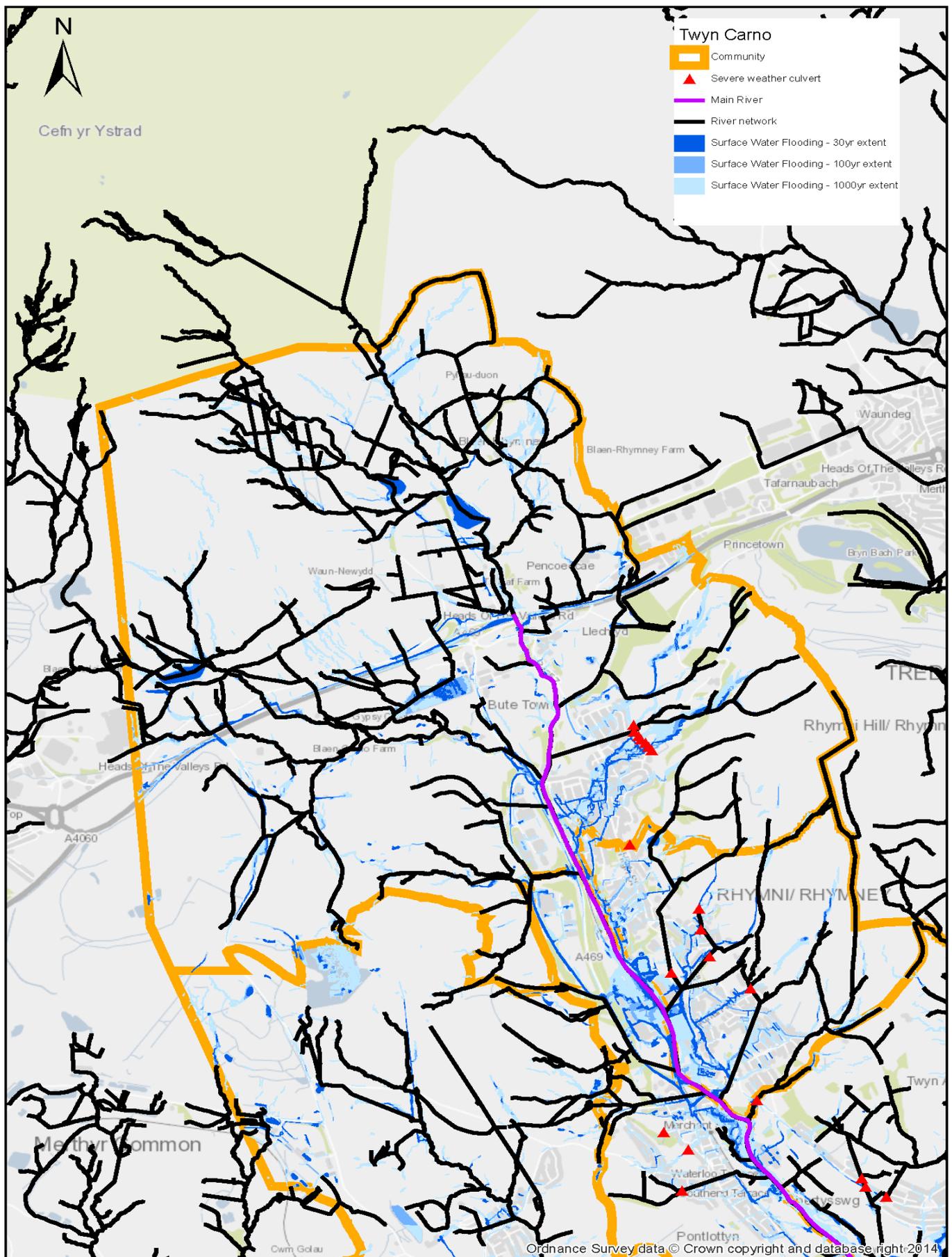


Figure 52: Flood Risk Map for Twyn Carno

The main flood risks have been identified as follows:***Oakland Terrace/Upper High Street/Ty Coch area:***

This area is predominantly at a high to medium risk of flooding affecting highways and potentially a number of properties in larger flood events. This is likely due to blockages or insufficient capacity of the local drainage network and ordinary watercourse culverts. Many of the reported flood incidents relate to blocked gullies and sewers. Access to a number of properties is likely to be restricted during flood events. Flooding in this area is likely to be exacerbated when water levels in the River Rhymney are high. Further investigations are proposed.

Heads of Valleys Industrial Estate area:

This area is generally at a high to medium risk of flooding mainly affecting highways although the surface water flood maps indicate a number of properties are potentially at risk. Flooding in this area is likely due to a blockage or insufficient capacity in the local drainage network and ordinary watercourse culverts. Access to the industrial estate and the properties adjacent to the Nant Carno could be limited during flood events. The Natural Resources Wales Flood Maps also indicate this area could be affected by flooding from the River Rhymney (main river) during large flood events. Further investigations are proposed.

A465:

The A465 is shown to be at high risk on the surface water flood maps. This is potentially due to a blockage or insufficient capacity of the road drainage network or culverts crossing beneath the road. As this is a main transport link in the area, access to the community may be restricted during flood events. There are no reported incidents of flooding on the A465 and it is likely that the flood mapping techniques exaggerate the actual risk. No specific investigations are proposed at this stage however flood incident reports will continue to be monitored.

Pen-y-dre area:

This area is predominantly at a low to medium risk of flooding affecting highways and potentially properties in larger events. This is likely due to blockages or insufficient capacity of the local drainage network and ordinary watercourse culverts. Many of the reported flood incidents relate to blocked gullies and sewers. Further investigations are proposed.

River Rhymney north of A465:

This area is predominantly at a low to medium risk of flooding affecting farm land and buildings. This is most likely due to exceedance of the channel capacity. There are no reported incidents in the vicinity therefore no specific investigations are proposed at this stage however flood incident reports will continue to be monitored.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Twyn Carno.

TWYN CARNO - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
TC01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance.	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
TC02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 86 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
TC03 CCTV survey of priority culverts identified in task TC02. Capacity check of priority culverts identified in task TC02.	0 – 5 (2015–2021)	£1.5k (< £100k)	M24	CCBC03 CCBC04
TC04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (all CCBC) (< £100k)	N/A	CCBC03
TC05 Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (<£100K)	M42 / M44	CCBC20

TWYN CARNO - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
TC06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC14
TC07	Use the outcomes from task TC02, TC03, TC05 and TC06 to assess the requirement for and scope of feasibility studies to reduce flooding from the Nant Carno and two un-named watercourses affecting the Ty Coch and Pen-y-Dre areas. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£50k (3 sites) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
TC08	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
TWYN CARNO COMMUNITY AREA:**

£65,000

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 5
5 Preparing	1 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**BESPOKE INTAKE STRUCTURE AT
TWYN CARNO**

7.21. Ynysddu Community Area

Overview:

Ynysddu is situated towards the centre of the Caerphilly County Borough Council area. It covers a largely rural area of approximately 14.1 km² and includes the settlement of Ynysddu adjacent to the River Sirhowy. The majority of the development in the area is residential, although there are two industrial estates located in the south and south east of Ynysddu adjacent to the River Sirhowy. There are also likely to be a number of small businesses and commercial properties and other non-residential properties and services. Neighbouring communities are Crosskeys, Machen, Trethomas, Bedwas, Maesycwmmmer, Pontllanfraith and Abercarn.

The River Sirhowy flows in a south easterly direction through Ynysddu before joining the River Ebbw in the neighbouring Crosskeys community. The majority of Ynysddu drains in a westerly direction towards the River Sirhowy with the western fringe draining to the east to the River Sirhowy. The Nant Draenog flows in a southerly direction through the centre of Ynysddu before joining the River Sirhowy. The Nant-y-Draenog reservoir is situated on the northern reach of this river. The Nant Hafod-tudur flows in a southerly direction to the River Sirhowy in the east of the community. There are numerous unnamed watercourses and field drains present in Ynysddu. The River Sirhowy is a designated main river and therefore the responsibility of Natural Resources Wales. It is assumed the developed areas are mainly drained via the local sewer network or culverted watercourses, discharging to the River Sirhowy.

Sources of flooding:

The main source of flooding in Ynysddu is main river flooding from the River Sirhowy. The Natural Resources Wales Flood Maps indicate the low lying areas, including residential and industrial properties and highways adjacent to the River Sirhowy, are potentially at risk during larger events although flood defences are present which reduce this risk. Flooding from ordinary watercourses is less extensive although some areas adjacent to the Nant y Draenog are shown to be at risk. Problems may also occur in more isolated locations for example due to culvert restrictions. Surface water flooding is not particularly extensive in Ynysddu although some areas including the industrial estates are shown to be at risk. As many of the ordinary watercourses are culverted where they pass through developed areas it is difficult to distinguish between surface water flooding and flooding from ordinary watercourses.

Available data:

The following flood risk information is currently available for Ynysddu:

- Natural Resources Wales Flood Map;
- Areas susceptible to groundwater flooding dataset;
- Updated Flood Map for Surface Water (based largely on generalised modelling);
- Flood incident reports collated by Caerphilly County Borough Council;
- Locations of severe weather culvert (where flooding has previously occurred or deemed to have potential to occur);
- Drawings relating to a culvert replacement scheme at the Ynysddu Hotel (2007);
- Drawings relating to a culvert replacement scheme at Llys Deri (2009);
- Drainage study and drawings relating to culvert upgrade works at Brook Cottages (2007).

The local flood risks can be summarised as follows:

Surface Water Flooding – The surface water flood maps show flooding mainly affecting highways and properties in the developed areas of Wyllie, Stanley Street, Wattsville and the Ynysddu industrial estate. These areas are generally shown as medium to low risk with more isolated areas shown at high risk. The surface water flood map takes a generalised approach to the representation of drainage systems. However, the mapping is indicative of areas most affected during high intensity storms or due to blockages. Many of the reported flood incidents relate to blocked gullies but incidents suggest the capacity of the drainage may be insufficient to cope with all storms. This may be exacerbated when water levels in the River Sirhowy are higher.

Ordinary Watercourses – Some areas in the vicinity of the ordinary watercourses are shown at risk of flooding, particularly in the vicinity of Stanley Street and at Wattsville. The surface water flood map is based on generalised modelling that does not properly account for existing culverts and drainage. However, the map is still indicative of areas at risk should culverts block or flows exceed their capacity. Table 88 shows important culverts that have been identified from the ‘At Risk Culvert Register’. Other critical structures may be identified as investigations progress.

Location	Comment	CCTV required (priority)	Capacity check required
Glen View Terrace.	This is a severe weather culvert. Limited flooding is shown on the surface water flood map. Watercourse not shown on mapping. Incidents reported.	2	Y
Opposite Llys-Deri, Commercial Street.	This is a severe weather culvert. Limited flooding is shown on the surface water flood map. A flood assessment/upgrade has been carried out for this culvert.	3	N
Rear of John Street.	This is a severe weather culvert. Limited flooding is shown on the surface water flood map. Reported incidents of culvert blockage and surcharging. A flood assessment was carried out at the Ynysddu Hotel.	2	Y
Glyn Terrace.	This is a severe weather culvert. Limited flooding is shown on the surface water flood map.	3	N
Veg Post 1.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map. Report of culvert blockage and surcharging. Flood assessment carried out at Brook Cottages.	2	Y
Veg Post 2.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map. Report of culvert blockage and surcharging. Flood assessment carried out at Brook Cottages.	2	Y

Location	Comment	CCTV required (priority)	Capacity check required
Veg Post 3.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map. Report of culvert blockage and surcharging. Flood assessment carried out at Brook Cottages.	2	Y
Veg Post 4.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map. Report of culvert blockage and surcharging. Flood assessment carried out at Brook Cottages.	2	Y
Above Brook Cottages, Cwmfelinfach.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map. Report of culvert blockage and surcharging. Flood assessment carried out at Brook Cottages.	2	Y
Outside 2 Brook Cottages. Cwmfelinfach.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map. Report of culvert blockage and surcharging. Flood assessment carried out at Brook Cottages.	2	Y
Glan-Nant Lane, Cwmfelinfach.	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map. Report of culvert blockage and surcharging. Flood assessment carried out at Brook Cottages.	2	Y
Duffryn Farm Lane	This is a severe weather culvert. Reasonable flooding is shown on the surface water flood map. Reported incident of culvert blockage.	2	Y

Table 88: Important Culverts - Ynysddu

Groundwater – Where it has been classified, the majority of Ynysddu is shown to have low susceptibility to groundwater flooding. There are several old coal mine shafts in Ynysddu which are potentially a source of groundwater flooding where dewatering operations have ceased. However, no reported incidents of groundwater flooding have been identified so this is not considered a significant issue.

Sewer Flooding – A number of areas at low risk of sewer flooding were identified in Ynysddu in the Preliminary Flood Risk Assessment, based on the DG5 incidents register. No high or medium risk areas were identified. Sewer flooding is usually the responsibility of Dŵr Cymru Welsh Water. It should be noted that once properties have been included in the DG5 register this means that funding can be put in place to implement measures to remove them from the register. Therefore the issues may subsequently have been resolved.

Interaction with main river – There is likely to be some interaction with the River Sirhowy, particularly in the lower reaches of the ordinary watercourses and drainage networks where outfalls may be surcharged by high river levels.

Conclusions from Flood Risk Maps:

The Flood Risk Maps and other available data indicate the main local flood risks in Ynysddu relate to main river flooding. Surface water and ordinary watercourse flooding are less extensive, however flooding due to these causes may be exacerbated when river levels are high. The reported flood incidents indicate that surface water flooding is often due to (or exacerbated) by blocked gullies or storm sewers. Table 89 summarises the impacts of flooding in Ynysddu, based on the surface water flood map. Figure 53 shows the Flood Risk Map for Ynysddu.

COUNTS FOR YNYSDDU COMMUNITY AREA				
Risk to People and Property	Totals in defined area	Risk Counts		
		LOW	MED	HIGH
<u>Residents in areas at risk of flooding depth >0.0m</u>				
People (n) (multiplier 2.35)	3941	127	12	5
<u>Residential Properties at risk of internal flooding depth >0.2m</u>				
Residential Properties (n)	1677	15	1	0
Services (n)	20	1	0	0
Risk to Economic Activity				
Non-Residential Properties (n)	422	13	4	2
Airports (n)	0	0	0	0
Primary/Trunk Roads (km)	0	0	0	0
Main Line Railways (km)	0	0	0	0
Agricultural Land – Grades 1, 2 and 3 (ha)	0	0	0	0
Risk to Natural and Historic Environment				
Bathing Waters (n)	0	0	0	0
Environmental Permitting Regulations (EPR) Installations (n)	2	0	0	0
Special Areas of Conservation (SAC) (ha)	0	0	0	0
Special Protection Areas (SPA) (ha)	0	0	0	0
Ramsar Sites (ha)	0	0	0	0
World Heritage Sites (ha)	0	0	0	0
Sites of Special Scientific Interest (SSSI) (ha)	0	0	0	0
Parks and Gardens (ha)	260.1	0	0	0
Scheduled Ancient Monuments (ha)	0.6	0	0	0
Listed Buildings (n)	13	0	1	0
Licensed Abstractions (LA) (n)	0	0	0	0
Sites of Interest for Nature Conservation (SINC) (ha)	368.9	7.7	2.8	9.3

Table 89: Impacts of Flooding in Ynysddu - Statistics

The counts representing flood risk from surface water in this area may be overstated as they include properties also at risk from river flooding.

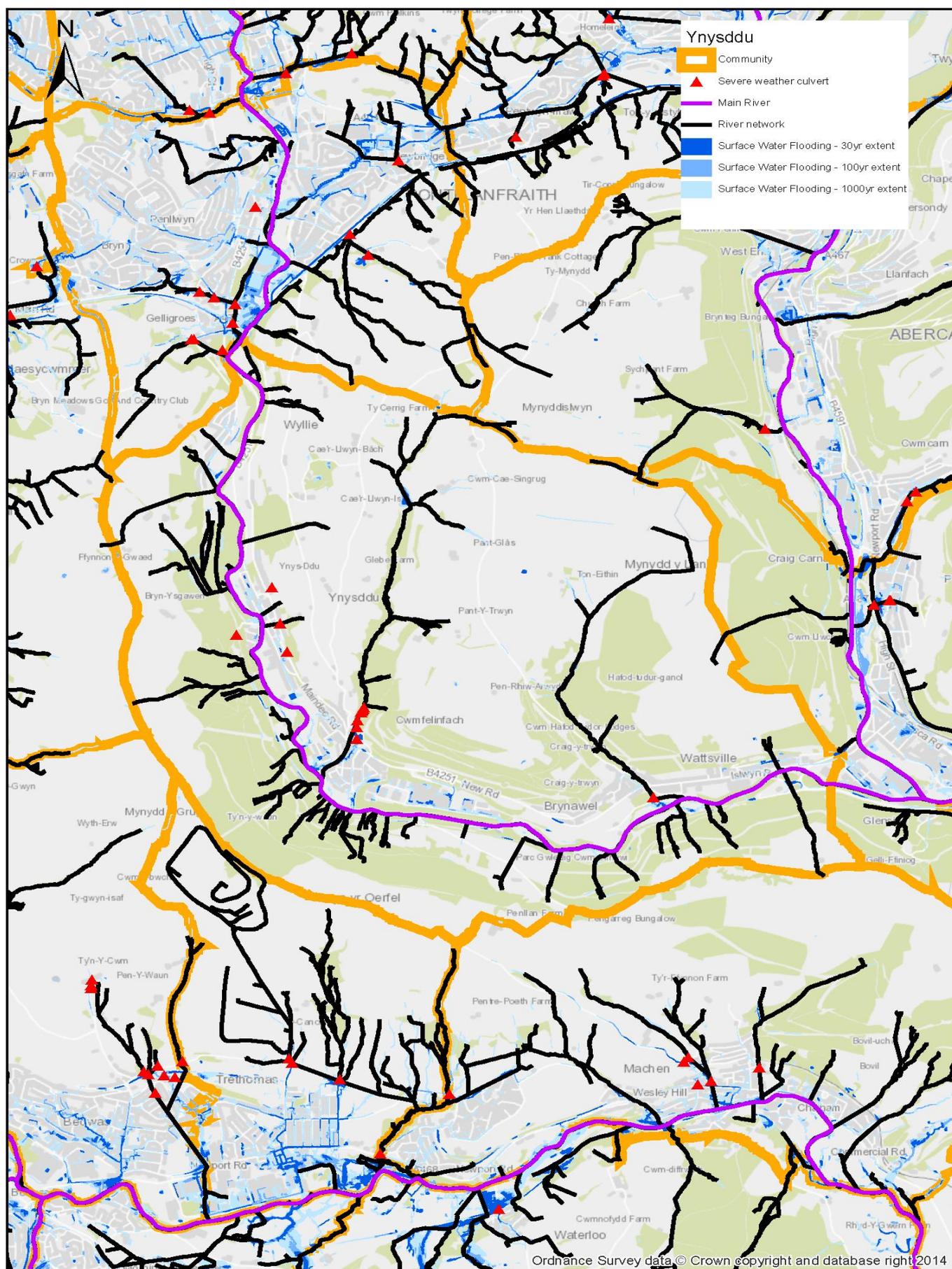


Figure 53: Flood Risk Map for Ynysddu

The main flood risks have been identified as follows:***Wyllie area:***

This is a low risk area from flooding affecting highways and potentially properties. Flooding in this area is likely due to blockages or capacity of the local drainage network. There are few reported flood incidents which generally refer to blocked gullies and storm drains. No further investigations are proposed at this stage however flood incidents will continue to be monitored.

Stanley Street area:

This area is predominantly at a high to medium risk of flooding. This is likely due to a combination of a blockage or the capacity of the ordinary watercourse culverts and local drainage networks. The surface water flood maps in this area show highways and potentially properties in the area at risk. Many of the reported flood incidents in the area refer to blocked gullies and storm sewers while there are also reported incidents of culvert blockages. This area is also shown at risk of main river flooding on the Natural Resources Wales Flood Maps. A significant number of properties and local highways are shown to be at risk. A culvert upgrade scheme is believed to have been carried out at Brook Cottages in 2007. Further investigations are proposed.

Ynysddu Industrial Estate:

This area is predominantly at a medium to low risk of flooding. This is likely due to a combination of a blockage or the capacity of local drainage networks. The surface water flood maps in this area show access roads and potentially buildings in the area at risk. There are no reported flood incidents in the area. No further investigations are proposed at this stage however flood incidents will continue to be monitored.

Wattsville area:

This area is predominantly at a low risk of flooding with isolated locations shown at high to medium risk on the surface water flood maps. The flooding in this area is likely due to a combination of blockages or the capacity of ordinary watercourse culverts and the local drainage network. Many of the reported flood incidents refer to blockages of gullies with one report referring to a blockage of the Duffryn Farm Lane ordinary watercourse culvert. The areas immediately adjacent to the River Sirhowy are shown to be at risk of main river flooding during larger flood events, however no properties are shown at risk on the Natural Resources Wales Flood Maps.

Measures to reduce flood risk:

The Local Flood Risk Management Strategy identified a suite of measures to reduce flood risk in the Caerphilly County Borough Council area. Based on a review of the available information the following specific implementation measures are currently proposed for Ynysddu.

YNYSDDU - SPECIFIC IMPLEMENTATION MEASURES				
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures	
			WG, NRW & EU	CCBC
Flood Forecasting, Warning & Response				
YD01 Community Flood Plan - Investigate potential for local flood action groups to monitor & assist with debris clearance	0 – 2 (2015–2021)	£5k (< £100k)	M43 / M44	CCBC01
Studies, Assessments & Plans				
YD02 <u>Site walkovers to:</u> Assess condition of culvert structures listed in Table 88 & identify culverts requiring more detailed assessment. Identify features acting as informal or defacto defences in the vicinity of the culverts. Assess the general material and condition of open channels & identify any local pinch-points. Identify any obvious locations where invasive species are present. Assess property threshold levels to better quantify the risk to properties. Identify locations where water quality may be affected by coal water discharges.	0 – 1 (2015–2021)	£500 (< £100k)	M24	CCBC03
YD03 CCTV survey of priority culverts identified in task YD02. Capacity check of priority culverts identified in task YD02.	0 – 5 (2015–2021)	£3k (< £100k)	M24	CCBC03 CCBC04
YD04 Undertake a Geographic Information System exercise to assess flood risks at refuse tips and other potential sources of contamination.	0 – 5 (2015–2021)	£2.5k (< £100k)	N/A	CCBC03

YNYSDDU - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
YD05	Continue to monitor and maintain a comprehensive register of flood incidents to improve understanding of current flood issues.	Ongoing	£500 (<£100K)	M42 / M44	CCBC03
YD06	Complete a consultation exercise with local residents and businesses, focussing on the areas identified above to improve information on previous flooding, its impacts and causes.	0 – 1 (2015–2021)	£2.5k (< £100k)	M24 / M44 / M53	CCBC14
YD07	Use the outcomes from task YD02, YD03, YD05 and YD06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourse near Stanley Street. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (1 site) (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28
YD08	Use the outcomes from task YD02, YD03, YD05 and YD06 to assess the requirement for and scope of studies to reduce flooding from ordinary watercourse at Wattsville. Subject to funding, this would involve a detailed survey of existing assets; hydraulic assessment to assess capacities and quantify flood risks; feasibility assessment of upgrades; and a preliminary assessment of benefits and potential funding sources.	0 – 5 (2015–2021)	£20k (<£100k)	M24 / M33	CCBC04 CCBC05 CCBC27 CCBC28

YNYSDDU - SPECIFIC IMPLEMENTATION MEASURES					
Community Area Measure	Timescale (Yrs)	Cost £	Links to Strategic Measures		
			WG, NRW & EU	CCBC	
YD09	Subject to funding, investigate need for and benefits of trash screen/culvert inlet monitor on ordinary watercourses near Brook Cottages.	0 – 2 (2015–2021)	£5k (1 site) (< £100k)	M41 / M42	CCBC02 CCBC23
YD10	Complete Geographic Information System exercise to identify council owned properties at risk of flooding and where Property Level Protection could be considered for future renovations (depths < 600mm).	0 – 2 (2015–2021)	£2.5k (all CCBC) (< £100k)	M23	CCBC25

**TOTAL COST OF MEASURES FOR
YNYSSDU COMMUNITY AREA:**

£61,500

In order for this Flood Risk Management Plan to be successful it is essential that significant additional funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Recovery and review 1	Preventing 6
7 Preparing	2 Protecting

NUMBER OF MEASURES IN EACH CATEGORY



**VEGETATION POSTS IN STREAMCOURSE
AT YNYSSDU**

8. Public Consultation

8.1. Caerphilly County Borough Council Flood Risk Partners.

A six week period of consultation on the Caerphilly County Borough Council Flood Risk Management Plan was carried out between Monday 13th July 2015 and 24th August 2015.

The following were consulted:

1. All the Risk Management Authorities as listed in Appendix 1;
2. All Caerphilly County Borough Council employees;
3. All Council Members;
4. Attempts were made to engage with the members of the public using the following means:-
 - Caerphilly County Borough Council webpage where an eye catcher was placed
 - Social media including Facebook and Twitter
 - Local libraries
 - The 200+ members of the Caerphilly County Borough Council Viewpoint Citizens Panel.

8.2. Method of consultation.

The draft Flood Risk Management Plan was published on the Caerphilly County Borough Council webpage prior to the commencement of the consultation period. A questionnaire was also published, which all Flood Risk Partners were encouraged to complete. Notice of the consultation was also included in the local media.

All responses to the draft Flood Risk Management Plan have been placed into a spreadsheet but no personal data was included. Caerphilly County Borough Council give, within the spreadsheet, a comment against each response received. This spreadsheet was published on the Caerphilly County Borough Council webpage within 12 weeks of the end of the consultation period.

All Risk Management Authorities; employees of Caerphilly County Borough Council and members of the public who requested details, were provided with a link to the Flood Risk Management Plan and Questionnaire on the webpage. Owing to the size of the documents no hard copies were provided.

The consultation questions together with the survey results and comments received can be found in Appendix 6.

8.3. Consultations and Engagement with Flood Risk Management Authorities and the Public.

Emergency Planning;

A meeting was held with Caerphilly County Borough Council Emergency Planning Team on 23rd September 2014. The main topics related to the extension of the existing systems of early warning and how they could be extended to include surface water flooding; the cost to Caerphilly County Borough Council of setting up their own flood warning system for surface water, and the benefits and methods of engagement with the public in flood risk areas to encourage and enhance community resilience.

Dŵr Cymru Welsh Water:

Meetings have been held between Caerphilly County Borough Council and Dŵr Cymru Welsh Water as one of our most significant risk partners to discuss the development of the Flood Risk Management Plan. Dŵr Cymru Welsh Water has also been in attendance at the South East Wales Flood Risk Management Group.

- Dŵr Cymru Welsh Water have provided details of their network of water supply mains, foul sewers, combined sewers and surface water pipes covering the whole of the Caerphilly County Borough Council area. Updated information will be provided by Dŵr Cymru Welsh Water on a six monthly basis;
- Currently there are no plans under the Asset Management Programme 6 (AMP6) programme for capital improvement works at Combined Sewer Overflows on ordinary watercourses;
- Dŵr Cymru Welsh Water has a plan for flooding schemes as part of AMP6 at:
 - Brookside Close, Caerphilly. This scheme provisionally identified for delivery in 2015 – 2016.
 - The Crown, Pontllanfraith and the Pontlottyn Road, Fochriw. These schemes are provisionally identified for delivery for 2017 – 2018.

Dŵr Cymru Welsh Water are finalising their internal processes for delivery of investment to resolve sewer flooding over the course of AMP6 (2015-2020). They are continuing with their established prioritisation methodology to target investment at customers with the highest suffering. Using this methodology, Dŵr Cymru Welsh Water has already identified the majority of schemes for delivery in 2015 – 2016 and 2016 – 2017. They are also developing solutions for more recent issues, which subject to cost-benefit assessment will form the remainder of their AMP6 programme. Their programme remains provisional, as it is dependent on OFWAT's final endorsement of their Final Business Plan. This was due to be completed in December 2014, after which they will formalise their investment programme;

- It was agreed that Caerphilly County Borough Council and Dŵr Cymru Welsh Water will collaborate on the introduction of sustainable drainage systems on new developments and there will be a free exchange of knowledge and experience;
- It was agreed that before surface water sewers are removed from Dŵr Cymru Welsh Water ownership, as culverted watercourses, discussion will take place with the riparian land owner and Caerphilly County Borough Council.

Welsh Government:

Some limited collaboration was established with Welsh Government through their attendance at the Flood Risk Management Working Group.

Natural Resources Wales:

Significant interaction with Natural Resources Wales was established through their attendance at the Flood Risk Management Working Group and South East Wales Flood Risk Management Group.

9. Monitoring and Review

Natural Resources Wales must review this Flood Risk Management Plan before publication.

The first review of the Flood Risk Management Plan will be completed by 22nd June 2021 and subsequent reviews will be carried out at 6 year intervals.

Following the review Caerphilly County Borough Council will prepare a revised Flood Risk Management Plan which will take into account the following:-

- The impact of climate change on the occurrence of flooding;
- An assessment of the progress made towards implementing the measures contained in this Flood Risk Management Plan;
- If measures have not been implemented a statement of reasons why those measures have not been implemented.

In the December of each year, following completion of this Flood Risk Management Plan the current position regarding the implementation of each measure listed will be monitored. Appropriate action will be taken where possible to complete the implementation in accordance with the time scale.

In order for the Flood Risk Management Plan to be successful it is essential that significant additional funding be made available from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

FLOOD RISK MANAGEMENT PLAN

APPENDICES

- APPENDIX 1: THE RISK MANAGEMENT AUTHORITIES**
- APPENDIX 2: MEASURES CONTAINED WITH THE LOCAL FLOOD RISK MANAGEMENT STRATEGY**
- APPENDIX 3: FLOOD RISK MANAGEMENT PLAN GEOGRAPHIC INFORMATION SYSTEM COUNTING METHODOLOGY - OVERVIEW**
- APPENDIX 4: GLOSSARY OF TERMS**
- APPENDIX 5: COMPONENTS OF THE FLOOD RISK MANAGEMENT PLAN AS DETAILED IN THE FLOOD RISK REGULATIONS 2009 – PART 4**
- APPENDIX 6: PUBLIC CONSULTATION – SURVEY QUESTIONS; RESULTS AND COMMENTS RECEIVED**



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Man gwyrddach

Appendix 1: The Risk Management Authorities

NATURAL RESOURCES WALES

- Flood Risk Management
- Former Countryside Council for Wales
- Former Forestry Commission Wales

Ty Cambria House,
29 Newport Road,
Cardiff, CF24 0TP.

South East Area,
Rivers House,
St Mellons Business Park,
Cardiff, CF3 0EY.

WELSH GOVERNMENT

- Flooding and Coastal Erosion

Welsh Government
Cathays Park
Cardiff, CF10 3NQ.

CAERPHILLY COUNTY BOROUGH COUNCIL (LEAD LOCAL FLOOD AUTHORITY)

- Engineering and Transport
- Planning and Regeneration
- Public Protection
- Corporate Finance

Penallta House,
Tredomen Park,
Tredomen,
Ystrad Mynach,
Hengoed, CF82 7PG.

Highways Operations Group
Highway House,
Penmaen Road,
Pontllanfraith, NP12 2DY.

DŴR CYMRU WELSH WATER

Pentwyn Road,
Nelson,
Treharris, CF46 6LY.

SOUTH WALES FIRE AND RESCUE SERVICE

Forest View Business Park,
Llantrisant,
Pontyclun, CF72 8LX.

WELSH AMBULANCE SERVICES NHS TRUST

South East Region Headquarters,
Vantage Point House,
Vantage Point Business Park,
Ty Coch Way,
Cwmbran, NP44 7HF.

GWENT POLICE

Police Headquarters,
Turnpike Road,
Cwmbran, NP44 2XJ.

GWENT LOCAL RESILIENCE FORUM

Police Headquarters,
Turnpike Road,
Cwmbran, NP44 2XJ.

NEWPORT CITY COUNCIL

Civic Centre,
Godfrey Road,
Newport, NP20 4UR.

TORFAEN COUNTY BOROUGH COUNCIL

Civic Centre,
Pontypool, NP4 6YB.

BLAENAU GWENT COUNTY BOROUGH COUNCIL

Municipal Offices,
Civic Centre,
Ebbw Vale, NP23 6XB.

RHONDDA CYNON TAF COUNTY BOROUGH COUNCIL

Headquarters,
The Pavilions,
Cambrian Park,
Clydach Vale,
Tonypany, CF40 2XX.

MERTHYR TYDFIL COUNTY BOROUGH COUNCIL

Civic Centre,
Castle Street,
Merthyr Tydfil, CF47 8AN.

CARDIFF CITY COUNCIL

County Hall,
Atlantic Wharf,
Cardiff, CF10 4UW.

POWYS COUNTY COUNCIL

Powys County Hall
Spa Road East
Llandrindod Wells
Powys, LD1 5LG

NETWORK RAIL

Western House,
1 Holbrook Way,
Swindon, SA1 1 BD.

SOUTH WALES TRUNK ROAD AGENT

12A Llandarcy House,
The Courtyard,
Llandarcy,
Neath, SA10 6EJ.

CADW

Plas Carew
Unit 5-7 Cefn Coed,
Parc Nantgarw,
Cardiff, CF15 7QQ.

NATIONAL FLOOD FORUM

Old Snuff Mill Warehouse,
Park Lane,
Bewdley,
Worcestershire, DY12 2EL.

NATIONAL FARMERS UNION**Head Office**

Agricultural House,
Stoneleigh Park,
Stoneleigh,
Warwickshire, CV8 2TZ.

NFU Cymru

Agriculture House,
Royal Welsh Showground,
Llanelwedd,
Builth Wells, LD2 3TU.

CAERPHILLY COUNTY BOROUGH COUNCIL - COMMUNITY AND TOWN COUNCILS

- Aber Valley Community Council
- Bargoed Town Council
- Blackwood Town Council
- Darren Valley Community Council
- Gelligaer Community Council
- Maesycwmmmer Community Council
- New Tredegar Community Council
- Rhymney Community Council
- Risca East Community Council
- Argoed Community Council
- Bedwas, Trethomas and Machen Community Council
- Caerphilly Town Council
- Draethen, Waterloo and Rudry Community Council
- Llanbradach and Pwllypant Community Council
- Nelson Community Council
- Penyrheol, Trecenydd and Energlyn Community Council
- Risca Town Council
- Van Community Council

Appendix 2: Measures Contained within the Local Flood Risk Management Strategy

- **Clause 6.13.1:** Sustainable and Strategic Development Planning
- **Clause 6.13.2:** Strategic Flood Risk Assessment/Strategic Flood Consequence Assessment
- **Clause 6.13.7:** Sustainable Drainage
- **Clause 6.14.2:** Flood Awareness
- **Clause 6.14.3:** Flood Warning
- **Clause 6.14.4:** Flood Forecasting
- **Clause 6.14.5:** Emergency Response Plans
- **Clause 6.14.6:** Community Flood Plans
- **Clause 6.15.1:** Land Management
- **Clause 6.15.2:** Resilience
- **Clause 6.15.3:** Resistance
- **Clause 6.15.4:** Restoration
- **Clause 6.15.5:** Environmental Enhancement
- **Clause 6.16.1:** System Asset Management Plans
- **Clause 6.16.2:** Defence/Structures and New Construction
- **Clause 6.16.3:** Channel Maintenance and New Construction
- **Clause 6.16.4:** Culverts, Gullies, Highway and Culvert Infrastructure Maintenance and New Construction
- **Clause 6.17.1:** Investigation
- **Clause 6.17.4:** Local Property-level Flood Mitigation – Resilience
- **Clause 6.17.5:** Local Property-level Flood Mitigation – Resistance
- **Clause 6.17.6:** Pre-feasibility Studies, Feasibility Studies
- **Clause 6.17.7:** Project Plans

Clause 6.13.1: Sustainable and Strategic Development Planning**Prevention****Detailed Objectives: 1, 2, 3, 4, 5, 6, 7, 8, 14, 15, 17**

Local authorities are required to prepare Local Development Plans that set out the framework of policies against which proposals for development are considered. Local Development Plans are required to be prepared in accordance with a raft of Welsh Government legislation and guidance. Local Development Plans are also required to ensure that sustainable development, which includes addressing climate change and its effects, is the cornerstone of the policy framework. Consequently the Caerphilly Local Development Plan enshrines sustainable development within its policy framework.

The single biggest influence that the Local Development Plan has in respect of flood risk is in effective land management. Local Development Plans effectively control land through making appropriate land allocations and through use of the policy framework. The Caerphilly Local Development Plan allocates sites for various land uses to meet the needs of Caerphilly County Borough Council Area for the plan period (up to 2021 for the Local Development Plan). The sites allocated in the Local Development Plan have been subject to rigorous assessment as part of the preparation of the Local Development Plan. As part of the assessment process flood risk issues were considered and sites with flood issues were not included in the Adopted Local Development Plan.

The Local Development Plan Policy framework includes policies that seek to control development in inappropriate locations and to encourage and facilitate development in appropriate locations. The Local Development Plan contains a suite of policies that assist in delivering such land management. However it should be noted that the issue of flood risk itself is not within the scope of the Local Development Plan. The Welsh Government requires that Local Development Plans do not reiterate national policy or guidance, but should provide a policy framework that works together with it. The vast majority of planning policy relating to flooding and its mitigation are contained in two Technical Advice Notes (TAN) published by the Welsh Government.

TAN 15: Development and Flood Risk is the primary guidance document and directly addresses the issues of flood risk and flood consequence management in land use development. The principle element of the TAN is the identification of Flood Zones. Flood Zones are areas that are identified on their relative risk of flooding. There are three zones, A, B and C as follows:

- Flood Zone C - being the zone most at risk to flooding (0.1% [1 in 1000year] chance of extreme flooding).
- Flood Zone B – areas known to have been flooded in the past.
- Flood Zone A – considered to be at little or no risk of flooding.

Zone C is further broken down into two sub-categories, C1 – areas at risk but served by significant infrastructure including flood defences, and C2 – areas at risk without flood defence infrastructure.

The TAN also sets out categories of development or land use, which are defined by the significance that flooding would have on them. The TAN identifies the following groups:

- **Emergency Services:** Facilities that need to be operational and accessible at all times, e.g. police stations, hospitals, command centres, emergency depots.
- **Highly Vulnerable Development:** Development where the ability of occupants to decide on whether they wish to accept the risks to life and property associated with flooding, or be able to manage the consequences of such a risk, is limited and industrial uses where inundation could lead to a risk to the public and the water environment, e.g. housing, public buildings, power stations, chemical plants.
- **Less Vulnerable Development:** Development where the ability of occupants to decide on whether they wish to accept such risks is greater than that in the highly vulnerable category, e.g. general employment, utilities.

The TAN uses the Flood Zones to restrict the type of development that can take place within each zone. Development is normally targeted away from Zone C, unless the proposed development meets the justification tests and is subject to a flood consequences assessment whose findings are acceptable. It should be noted that, within Zone C2, Emergency Services and Highly Vulnerable development are not permitted.

Within Zones A and B development is generally acceptable subject to assessment of flood risk and, if required, acceptability of a Flood Consequences Assessment. The allocations in the Local Development Plan comply with TAN15.

TAN 12 – Design: Whilst not directly addressing the flooding issue, TAN 12 provides guidance on the design of development. It promotes the use of sustainable drainage systems and sets out guidance that seeks to reduce the causes, and mitigate the effects, of climate change.

As The Strategy is implemented through the plans it may become evident that there is a potential conflict between the Local Development Plan and the Strategy. Areas of land identified within the Local Development Plan as being suitable for development may be deemed unsuitable when the detailed plans are produced. The Local Development Plan cannot be altered until the next review but the Planning Department would be made aware of the potential conflict and at the next review the Local Development Plan will be amended to take the plans into account.

- Benefits:**
 - The Local Development Plan provides a strategic policy framework which facilitates the effective management of flood risk by directing new development away from those areas which are at a high risk of flooding;
 - New developments will be at low risk of flooding.
- Time Scale for Implementation:**
 - Short Term: 0-20 Years.

Clause 6.13.2: Strategic Flood Risk Assessment/Strategy Flood Consequences Assessment

Prevention

Objectives: 1, 2, 3, 4, 12

The Welsh Government guidance document TAN 15 – Development and Flood Risk addresses the issue of flood risk and development (please see Sustainable and Strategic Development Planning above). TAN 15 sets out the requirement for Strategic Flood Risk Assessment and Strategy Flood Consequences Assessment to be part of the development plan process.

TAN 15 requires that councils preparing development plans undertake an assessment of the risk of flooding from its proposed land allocations. This assessment is undertaken on a strategic basis, i.e. considering the authority as a whole, and is termed Strategic Flood Risk Assessment. This assessment considers all of the allocations, their compliance with the Flood Zone requirements and will establish whether there are sites where there is a risk of flooding, which will then require an assessment of the consequences of the development and flooding downstream.

Where sites have been identified with flood risk they will need to be subject to an assessment of the consequences of the development in respect of flooding across the wider area. This assessment is undertaken at a strategic level, i.e. considering the development generically rather than in detail, and is termed Strategic Flood Consequences Assessments. The assessment considers the effects on flooding elsewhere in the flood area if the development were to take place. If the consequences of the development are acceptable the site is considered acceptable.

Each site in the Local Development Plan has been the subject of a Strategic Flood Risk Assessment and a small number of sites were subject to a Strategy Flood Consequences Assessment.

Benefits:

- Strategic Flood Risk Assessment allows the consideration of flood risk to inform the location of new development in development plans;
- Strategic Flood Consequences Assessments allowed the consequences of flooding to inform the location of new development in development plans;
- Strategic Flood Consequences Assessments also enabled consideration of potential increases in surface water runoff arising from new development, including the potential application of sustainable drainage systems.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.13.7: Sustainable Drainage

Prevention

Detailed Objectives: 1, 2, 3, 4, 13, 14, 15 17

Engineering Issues:

Within the Flood and Water Management Act 2010, Caerphilly County Borough Council has been designated as a Lead Local Flood Authority for its administrative area.

Lead Local Flood Authorities in Wales will take on the role of the Adopting and Approving Body in relation to sustainable drainage systems. In this role Caerphilly County Borough Council will be responsible for both approving the original design of the Sustainable Drainage Systems and adopting and maintaining the finished system.

Caerphilly County Borough Council has a commitment to promote the use of Sustainable Drainage Systems wherever new sites are developed or where brownfield sites are re-developed.

The philosophy of Sustainable Drainage Systems is to replicate, as closely as possible, the natural drainage from a site before development.

It is anticipated that Sustainable Drainage Systems will achieve the following:

- Reduce runoff rates, thus reducing the risk of downstream flooding;
- Reducing the additional runoff volumes and runoff frequencies that tend to be increased as a result of urbanisation, and which can exacerbate flood risk and damage receiving water quality;
- Encourage natural groundwater recharge to minimise the impact on aquifers and river base flows in the receiving catchment;
- Reducing pollutant concentration in stormwater, thus protecting the quality of the receiving water body;
- Acting as a buffer for the accidental spills by preventing direct discharge of high concentrations of contaminants to the receiving water body;
- Reducing the volume of surface water runoff discharging to combined sewer systems, thus reducing discharges of polluted water to watercourses via Combined Sewer Overflows spills;
- Contributing to the enhanced amenity and aesthetic value of developed areas;
- Providing habitats for wildlife in urban areas and opportunities for biodiversity enhancement.

The following techniques will be considered as part of Sustainable Drainage Systems – filter strips, swales, infiltration basins, wet ponds, extended detention basins, constructed wetlands, filter drains and perforated drainpipes, infiltration devices, pervious surfaces and green roofs.

The information above has been taken from The Sustainable Drainage Systems Manual prepared by the Construction Industry Research and Information Association (CIRIA).



Planning Issues:

As outlined in 'Sustainable and Strategic Development Planning' above, TAN 12 – Design promotes the use of Sustainable Drainage Systems in the design of new development. However, despite this guidance, the issue of adoption complicates it. Normally, the Council will adopt the drainage system provided as part of a new development. However the Council do not, currently, adopt Sustainable Drainage Systems. Consequently developers are reluctant to incorporate Sustainable Drainage Systems into their designs as they will maintain liability for the system.

It is acknowledged that the position may change in the near future under potential changes being instigated by the Welsh Government. But until such time as a body exists that will adopt such drainage systems, it is unlikely that developers will want to utilise Sustainable Drainage Systems in their development proposals.

Benefits:

- Policy framework contributes to managing flood risk, protecting water quality and reducing environmental damage;
- Improve the quality of surface water.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.14.2: Flood Awareness

Preparedness

Detailed Objectives: 1, 2, 3, 4, 9, 10, 12, 13

As part of its community leadership role, the Council recognises its role in raising awareness within communities that are at risk of flooding.

To this end the Council works closely with the Environment Agency (now Natural Resources Wales) as part of their public Flood Awareness Wales campaign that aims to ensure that those communities at risk of flooding know how to prepare and how to respond during a flooding incident.

To date the Council has taken part in a number of community meetings and drop in sessions to help promote the development of community flood plans.

In addition, through its website, the Council provides advice, guidance and simple actions to help individuals prepare for and deal with the consequences of flooding. The website also provides links to Environment Agency (now Natural Resources Wales), factsheets and guidance documents.

The Council is also working with the Environment Agency (now Natural Resources Wales) to promote the completion of business flood plans with business in flood risk areas and also provides business continuity advice through its website.

Benefits:

- Raise awareness of flood risk within the communities of Caerphilly County Borough Council Improve the quality of surface water.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.14.3: Flood Warning**Preparedness****Detailed Objectives: 1, 2, 3, 4, 9, 10, 12, 13**Weather Warnings:

The Met Office National Severe Weather Warning Service provides warnings of severe or hazardous weather, which could range from widespread disruption of communications to conditions resulting in transport difficulties or threatening lives.

It is a free at point of use warning service, mainly for Category 1 and 2 responders. The warnings alert recipients to a forecasted severe/extreme weather event which allows planning to occur to mitigate or reduce the impact of the weather.

Warnings are also provided to the general public via the broadcast media and the Met Office Website.

Warnings are received by the Council via e-mail directly to the Senior Emergency Planning Officer. The e-mails are automatically disseminated to nominated personnel within each Directorate. The statements are used to inform specific actions undertaken within Directorates, as part of their flooding preparations and response.

Flood Warnings:

The Environment Agency (now Natural Resources Wales) provides a flood warning service throughout Wales in areas at risk of flooding from rivers or the sea.

Using the latest available technology, Environment Agency (now Natural Resources Wales) staff monitors rainfall and river levels 24 hours a day and use this information to forecast the possibility of flooding. If flooding is forecast, the Environment Agency (now Natural Resources Wales) issue warnings using a set of three different warning types.



The Environment Agency (now Natural Resources Wales) issue warnings by;

- Phone, text, email or fax via the Floodline Warnings Direct service.
- The Environment Agency (now Natural Resources Wales) Website.
- Floodline where there is recorded information on the latest warnings and predictions, or the facility to speak to an operator for more general information 24 hours a day.
- Through the media.

The Caerphilly County Borough Area Local Flood Warning Plan identifies areas that are at risk from main river flooding within the County Borough Area and describes the arrangements that are in place and the systems used to issue flood warnings.

The Council are also recipients of the Environment Agency (now Natural Resources Wales) Flood Warnings for those areas identified in the Caerphilly County Borough Area Local Flood Warning Plan. The warnings are used to inform specific actions undertaken within appropriate Departments as part of their flooding preparations and response.

Surface Water Flood Forecasting and Warning:

As a Lead Local Flood Authority the Council is aware of the risks associated with surface water flooding and the impact that it can have on its communities. Surface water flooding can happen so quickly and with communities caught unawares the effects can be severe.

In 2011 the Department for Environment, Food and Rural Affairs (Defra) set up a cross-government steering group to coordinate the development of surface water flood forecasting and warning services. The group is made up of Defra, Welsh Government, Environment Agency (now Natural Resources Wales), Flood Forecasting Centre, Met Office, Lead Local Flood Authorities and Local Government Associations in England and Wales.

The Steering Group is currently holding a number of workshops for strategy developers and flood responders from local authorities, water companies, infrastructure owners and other relevant national and local organisations with an interest in surface water flooding. The workshops will gather views on what future surface water services could look like and discuss possible ways of delivering them. The workshops will also help inform the Environment Agency (now Natural Resources Wales) work to produce its new Flood Incident Management Strategy.

The Council is fully engaged in this process.

Benefits:

- To give local communities as much warning of potential flooding as possible to allow residents to take appropriate action.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.14.4: Flood Forecasting

Preparedness

Detailed Objectives: 1, 2, 3, 4, 9, 10, 12, 13

Flood forecasting within the Council is dependent on the information supplied by the Flood Forecasting Centre, which is a partnership between the Met Office, Environment Agency (now Natural Resources Wales).

Established in 2009 and operational 24 hours a day, 7 days a week, the centre forecasts for all natural forms of flooding that could affect the Caerphilly County Borough Council area, including river, surface water and groundwater.

To assist Category One and Two’s responders in planning and responding to flooding, the Flood Forecasting Centre produces a Flood Guidance Statement, which presents an overview of the flood risk across five days and identifies possible severe weather, which could cause flooding and significant disruption to normal life.

As with Weather Warnings, Flood Guidance Statements are received by the Council via e-mail directly to the Senior Emergency Planning Officer and are automatically disseminated to nominated personnel within each Directorate.

The statements are also used to inform specific actions undertaken within Directorates as part of their flooding preparations and response.

The Flood Guidance Statement is issued daily by the Flood Forecasting Centre which shows a rolling five day forecast of flood risk at county level for England and Wales. These are categorised into fluvial and coastal and/or surface water flooding risk. Awareness of this type of problem is dependent upon Local Authorities monitoring potential trouble spots together with information received from the general public.

- Benefits:**
 - To give local communities and individuals the maximum amount of warning possible.
- Time Scale for Implementation:**
 - Short Term: 0-20 Years.

Clause 6.14.5: Emergency Response Plans**Preparedness****Detailed Objectives: 1, 2, 3, 4, 9, 10, 12, 13**

In addition to the plans and procedures published by the Council, the Environment Agency (now Natural Resources Wales) also produce a plan which describes the arrangements that are in place and the systems used to issue warnings to locations at risk of flooding from main river watercourses, within the Caerphilly County Borough Council Area. This plan, maintained by Environment Agency (now Natural Resources Wales), is distributed to all agencies with a role to play in the response to flooding.

Benefits:

- To manage the response of Caerphilly County Borough Council and its Risk Partners to various emergencies including flooding.
- To give support to the communities during and after emergencies.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.14.6: Community Flood Plans

Preparedness

Detailed Objectives: 1, 2, 3, 4, 9, 10, 12, 13

Caerphilly County Borough Council has only one Community Flood Plan in place covering Ynysddu community. This area was chosen by the Environment Agency (now Natural Resources Wales) as it is considered to be one of the communities at greatest risk of river flooding within Wales.

A Flood forum was set up by the Environment Agency Wales bringing together representatives of the community of Ynysddu, Local Councillors, Environment Agency Wales employees and staff members from Caerphilly County Borough Council Emergency Planning and Engineering Groups.

Although the forum was established to produce a Community Plan relating to a main river, in this case the River Sirhowy, it is considered as an appropriate grouping to consult as part of the preparation of the Flood Risk Management Strategy as the same community is also subject to flooding from surface water, ordinary watercourses and their interface with the River Sirhowy. A meeting has taken place with the Ynysddu Flood Forum to assist in the preparation of this Strategy and a number of questionnaires were filled in by members of the public attending the meeting.

In addition, the Environment Agency (now Natural Resources Wales) with Caerphilly County Borough Council has investigated the possibility of establishing Flood Forums at Cwmfelinfach and Risca in order to produce Community Flood Plans for these areas. A forum has also been set up for the Dyffryn Business Park.

Benefits:

- The local communities will be made more aware of the risks of flooding to their properties.
- The plans will allow individual house holders to prepare their own Flood Risk Plans.
- The social and economic effects of any likely flooding will be reduced.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.15.1: Land Management

Prevention

Detailed Objectives: 1, 2, 3, 4, 5, 6, 7, 8, 12, 13, 14, 15, 18

Planning Issues:

As previously outlined (refer to Sustainable and Strategic Development Planning) the single biggest influence that the Local Development Plan has in respect of flood risk is in effective land management. Allocating land for development in appropriate locations and providing a policy framework that assists in directing development away from flood risk areas are key elements of land management and flood risk. The Local Development Plan also identifies open areas for protection, such as Special Landscape Areas (6) and Visually Important Local Landscapes (5) and areas of nature conservation importance such as Sites of Importance for Nature Conservation (190), all of which contribute to reducing the risk of flooding.

Caerphilly County Borough Council is also a significant landowner in the area, providing many important open areas for informal and formal leisure and recreation. The Council has established 5 country parks and is currently progressing with a community park in the Bedwas-Trethomas-Graig-y-Rhacca area. In addition to this the Council work actively with landowners and farmers on environmental projects, such as Glastir, an agri-environmental scheme.

However it should be noted that the Council have extremely limited powers to intervene or control what happens on the vast majority of land within the Caerphilly County Borough Council area, particularly in respect of agriculture, which has extensive permitted development rights.

Engineering Issues:

In order to reduce total runoff and/or control peak flows from catchments above areas identified as being subject to flood risk Caerphilly County Borough Council will consider introducing various methods of catchment management.

Where forestry planting has been introduced Caerphilly County Borough Council will enter into discussions with land owner to discuss felling and tree planting programmes to minimise increases in runoff after felling or reductions to peak flows in the medium term. It is anticipated that the Forestry Commission (Now Natural Resource Wales) as one of the Risk Partners with Caerphilly County Borough Council will be engaged in consultation to control these processes.

Control over the construction of drainage systems within the forestry will also be discussed.

Caerphilly County Borough Council as the Lead Local Flood Authority will also consult with Farming Unions and local farmers to discuss methods of farming, such as the direction of ploughing, which affects the nature of the runoff from farmland. The planting of shelter belts will also be considered.

The use of fertiliser and other chemicals used in the farming industry will also be discussed in an attempt to limit contamination of downstream watercourses.

Benefits:

- Integrated land management opportunities benefiting a range of themes simultaneously, theoretically broadening the scope and increasing the likelihood of funding for projects that will improve land water management.
- Reduction of surface water runoff and peak flows.
- Reduction of contamination to surface water runoff.

Time Scale for Implementation:

- Short and Medium Term: 0-50 Years.

Clause 6.15.2: Resilience

Preparedness

Detailed Objectives: 5, 6, 7, 8, 14

Within Caerphilly County Borough Council a culture of resilience to flood will be adopted in relation to property and land subject to flood risk. This will entail the restoration of land and property as quickly as possible following a flood event. The standard of restoration will be set appropriately to return habitats to their previous condition without significant change.

Where land contains Sites of Special Scientific Interest (SSSIs) or Sites of Importance for Nature Conservation (SINCs) measures will be adopted which will minimise the risk of flooding if flooding is considered to be of detriment to the habitat. It must however be accepted, that total removal of risk will not be possible. As such the sites will be appropriately managed to increase the ability of the environments to cope with any changing conditions that may arise.

Where land containing SSSIs or SINCs is identified as being subject to flood risk, surveys and reports will be carried out to identify the potential damaging effects of flooding and what measures could be implemented to reduce the flood risk.

Such measures may include the construction of swales, drainage ditches or small earth bunds to divert surface water from the sensitive areas to areas of less environmental significance.

- Benefits:**
 - To preserve existing habitats particularly SSSIs and SINCs.
 - To return flooded habitats to their original condition as soon as possible.
- Time Scale for Implementation:**
 - Short Term: 0-20 Years.

Clause 6.15.3: Resistance**Protection****Detailed Objectives: 5, 6, 7, 8, 14**

Within Caerphilly County Borough Council a culture of resistance to flood risk will be adopted in relation to property and land subject to flood risk. This will entail the implementation of measures which will reduce the risk of flood water entering properties and land which would be adversely affected by flooding.

Where land contains Sites of Special Scientific Interest (SSSIs) or Sites of Importance for Nature Conservation (SINCs) measures will be adopted which will minimise the risk of flood water entering the site although it must be accepted that total removal of risk will not be possible and that such sites will have a lower priority than the reduction of flood risk to people and residential property.

Where land containing SSSIs or SINCs is identified as being subject to flood risk surveys and reports will be carried out to identify the potential damaging effects of flooding and what measures could be implemented to reduce the flood risk.

Such measures may include the construction of swales, drainage ditches or small earth bunds to divert surface water from the sensitive areas to areas of less environmental significance.

Benefits:

- To preserve existing habitats particularly SSSIs and SINCs.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.15.4: Restoration**Prevention****Detailed Objectives: 5, 6, 7, 8, 14, 15**Planning Issues:

Land restoration is generally undertaken on land that has previously been subject to land uses that have had a significant adverse impact upon the land. Restoration sites are generally one of two types (or a mixture of both), former mineral/coal extraction sites or sites of chemical contamination from industrial processes.

Land reclamation/restoration is a reactive action, rather than a proactive one, and, as such, the methods and details of any scheme are dependent upon the circumstances of the site. Consequently flood risk is taken into account only as far as the site constraints allow.

The majority of large-scale restoration or reclamation schemes are undertaken using public grants or funding. In many cases public funding for such schemes is prioritised, with schemes that realise economic benefits (particularly in the form of development) being more likely to receive funding. Consequently the vast majority of large-scale restorations / reclamations are accompanied by built development. It is important to note that this development takes place on brownfield sites and as such satisfies one of the criteria set out in TAN 15 that permits certain developments in flood risk areas.

Engineering Issues:

Traditionally Caerphilly County Borough Council has been subject to extensive mining for coal and iron ore. Various forms of deep mining have been used resulting in numerous large deposits of waste material on the surface in the form of tips. All coal and iron ore extraction by this method has now ceased within the Caerphilly County Borough Council area.

In more recent years coal extraction by opencast mining has been adopted and although significant excavations are carried out as part of the extraction process the sites are usually restored before works are completed.

In addition there has been a tradition of quarrying for building stone and aggregates. This type of operation generally leaves a vertical excavation forming a scar on the landscape.

Over the last 50 years the Welsh Government and its predecessors have funded numerous schemes within the Caerphilly County Borough Council area to restore sites that have been subject to mineral extraction and where significant derelict land has been left untreated. When such engineering works are planned it is the policy of Caerphilly County Borough Council to restore sites to a land form which blends well with the surrounding landscape and produces a natural land appearance. This form of restoration usually includes planting trees and seeding for stabilisation, which reduce surface water runoff. These sites will be managed, particularly the woodlands, in order to maximise the stabilisation of the restored land and to minimise surface water flow.

Drainage on these sites usually takes the form of drainage ditches, swales, French drains, surface water sewers and lined channels. These techniques usually restore the surface water runoff to a level similar to green field values particularly after the vegetation has been established and the site matured.

Any site which is subjected to major earthworks is likely to cause significant silt pollution to the local surface water and ordinary watercourses. In order to control the discharge from the site and to ensure that the quality of the water meets the Environment Agency (now Natural Resources Wales) standards for Discharge Consent the developer will have to install a series of settlement ponds. The ponds will need to be cleared of silt on a regular basis and the discharge will be monitored.

It is the policy of Caerphilly County Borough Council to restore all derelict land, where appropriate, to beneficial use.

Benefits:

- To establish new natural habitats.
- To restore land to beneficial use.

Time Scale for Implementation:

- Short and Medium Term: 0-50 Years.

Clause 6.15.5: Environmental Enhancement**Prevention****Detailed Objectives: 5, 6, 7, 8, 14, 15, 17**

Caerphilly County Borough Council submits bids for funding, from various sources, to implement environmental improvements in urban and rural areas. These schemes cover a wide-range of projects from hard surface environments to natural environments and even habitat creation. However, such schemes are inevitably part of a larger development or improvement and are, therefore, often constrained in their scope.

Where possible such schemes should take account of, and improve, the situation in respect of flood risk.

Benefits:

- Decreased surface water runoff on new developments and publicly funded environmental enhancements.

Time Scale for Implementation:

- Short, Medium and Long Term: 0-100 Years.

Clause 6.16.1: System Asset Management Plans**Protection****Detailed Objectives: 11, 13**

Under the Flood and Water Management Act 2010, Caerphilly County Borough Council, as a Lead Local Flood Authority, is required to maintain a register of structures or features that, in the opinion of the authority, are likely to have a significant effect on a flood risk in the Caerphilly County Borough Council area. Information must be recorded about each of the structures and features including ownership and the state of repair.

In order to satisfy this requirement Caerphilly County Borough Council has set up a database using Excel and layers within ArcMap Geographic Information System, which have the following information recorded:

- Records within the Excel database and Geographic Information System layer showing all known culverted watercourses and all associated manholes, intakes and outlets, owned by Caerphilly County Borough Council and other land owners.

More recently Caerphilly County Borough Council has purchased three modules of a bespoke system for Asset Management. It is this system, which will be used in the future for the management of drainage structures including the following:

- Database of all known pipes, culverts, channels, drainage ditches, manholes, intakes and outfalls;
- Geographic Information System layers of all known pipes, culverts, channels, drainage ditches, manholes, intakes and outfalls;
- Records of all inspections carried out to grids or culverts;
- Records of cleaning of grids and gullies.

The system of database and Geographic Information System layers will be used by Caerphilly County Borough Council to manage drainage assets. Further information is required and the following surveys and calculations will be needed to be carried out:

- Calculation of capacity of each culvert;
- Identification of intake structures below current Environment Agency (now Natural Resources Wales) standards, which will need to be upgraded;
- Identification of all owners and their contact details;
- Current condition of each significant culvert.

Where areas are identified which are subject to a high level of flood risk one of the measures which will be considered in order to reduce flood risk will be the construction of new surface water culverts or channels.

Benefits:

- Provide details of all existing drainage structures which are likely to affect flood risk;
- Give easy and efficient access to available information;
- Provide condition surveys and maintenance records for all drainage structures;
- Maintain records of cleaning and inspection of grids and gullies.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.16.2: Defence/Structure Management and New Construction Protection**Detailed Objectives: 1, 2, 3, 4, 9, 11, 12, 13**

Caerphilly County Borough Council has a number of formal flood defences, which have been plotted within the Geographic Information System. These defences are largely earth formed embankments, which have been constructed by the Environment Agency (now Natural Resources Wales).

A survey will be implemented in order to establish a list of the defences within the Caerphilly County Borough Council area, including details of their construction and condition.

In addition Caerphilly County Borough Council has a number of informal flood defences, which may include items such as boundary walls to properties, embankments constructed for highway schemes, individual properties, or even kerb lines. Although these features were not constructed as flood defences, in some cases they defend properties against flooding and in others they affect the route of surface water during floods and therefore can significantly affect flood risk.

It is proposed that some informal structures controlled by individuals or government organisations be identified as part of the Hazard and Risk Management Plans to be prepared by June 2012. This information will then be included in the Caerphilly County Borough Council database of drainage assets.

Benefits:	<ul style="list-style-type: none">• To exclude flood water from areas identified as subject to flood risk.
Time Scale for Implementation:	<ul style="list-style-type: none">• Short and Medium Term: 0-50 Years.

Clause 6.16.3: Channel Maintenance and New Construction Protection

Detailed Objectives: 1, 2, 3, 4, 9, 11, 12, 14, 17

Drainage channels, which have been identified as being significant to flood risk, have been included in the Caerphilly County Borough Council database of drainage structures and the Geographic Information System layers.

Where these structures are in the ownership of Caerphilly County Borough Council they are maintained by the Caerphilly County Borough Council Drainage Department. Channels may include ordinary watercourses, lined channels, drainage ditches and swales.

The condition of these culverts is unknown and maintenance is carried out on an “as required” basis and may include the following:

- Cutting of grass and shrubs where this may impede flows and reduce channel capacity;
- Repairs to concrete inverts or bank protection where damage has occurred, which could undermine the integrity of the channel.

It is proposed as part of this strategy that surveys will be carried out of all known channels, which are considered to be significant in terms of flood risk. The surveys will identify details of the construction materials, size and shape of the channel and its condition.

From this survey information a detailed programme of work will be drawn up for the maintenance and/or replacement of all existing channels.

Following the next round of surface water modelling and the preparation of Hazard and Risk Maps, the Flood Risk Management Plans will be written. These plans will identify individual measures to be implemented in each flood risk area, which may include the construction of additional channels to carry excess surface water from areas of high flood risk.



Benefits:

- To bring all channels on significant watercourses to be fit for purpose;
- To ensure that all channels are well maintained.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.16.4: Culverts, Gullies, Highway and Culvert Infrastructure Maintenance and New Construction

Protection

Detailed Objectives: 1, 2, 3, 4, 9, 11, 12, 13

Culverts and pipes, which have been identified as being significant to flood risk, have been included in the Caerphilly County Borough Council database of drainage structures and on the Geographic Information System layers.

Where these structures are in the ownership of Caerphilly County Borough Council or have been classified as being of strategic importance they are maintained by the Caerphilly County Borough Council Drainage Department.

Where access inside the culverts is relatively easy and the culvert is regarded as being of strategic importance they are inspected on an annual basis.

Most of the culverts, which are in Caerphilly County Borough Council ownership, do not fall into this category and therefore their condition is unknown and maintenance is carried out on an “as required” basis and may include the following:

- Repairs to culvert inverts and walls where the construction is in masonry;
- Replacement of sections of culvert, which have collapsed using modern pipes;
- Replacement or repair of existing structures such as manholes, intakes and outlets;
- Construct new or improved intakes to culverts where existing structures are reducing the operational capacity of culverts or causing risk of flooding due to blockage. The new structures will be designed and built in accordance with the Environment Agency (now Natural Resources Wales) Code of Practise for intakes.

It is proposed as part of this strategy that surveys will be carried out of all culverts, which are considered to be significant in terms of flood risk. The surveys will identify details of the construction materials, size and shape of the culvert and its condition.

From this survey information a detailed programme of work will be drawn up for the maintenance and/or replacement of all existing culverts. Consideration will also be given to the feasibility to restore culverts back to open watercourses.

Following the next round of surface water modelling and the preparation of Hazard and Risk Maps, the Flood Risk Management Plans will be written. These plans will identify individual measures to be implemented in each flood risk area, which may include the construction of additional culverts designed to modern standards to carry excess surface water from areas of high flood risk.



Blocked Grid Following Heavy Rain

Caerphilly County Borough Council has the following Operational Procedures in order to maintain the surface water assets:

- Land Drainage – Maintenance and Renewal.
- Sandbag Operational Procedure.
- Severe Weather Culvert Inspections.
- Ditches and Dredging.
- Equipment used to investigate Drainage Problems.
- Out of hours (Duty Officer Manual) – April 2012 (Section relating to flooding incidents).
- Winter Service Plan 2011 - 2012
- Survey Sheet.
- Gully Cleansing.
- Gully Schedule Referral System.
- Highway Maintenance and Renewal.

Benefits:

- To bring all culverts on significant watercourses to a fit for purpose standard;
- To ensure that all culverts are well maintained.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.17.1: Investigation**Preparedness****Objective: 14**

In the preparation of this strategy and identification of measures, which may be implemented as part of the Risk Management Plans a number of issues have been identified in terms of the lack of information currently available within Caerphilly County Borough Council. It is proposed that numerous surveys and investigations will be carried out in order to supplement the information already available.

A list of the surveys required is given below:

- Where land containing Sites of Special Scientific Interest (SSSIs) or Sites of Interest for Nature Conservation (SINCs) is identified as being subject to flood risk, surveys and reports will be carried out to identify the potential damaging effects of flooding and what measures could be implemented to reduce the flood risk;
- Survey of water bodies with area greater than 2,000 m²;
- Additional information required for the database and Geographic Information System layers;
 - Calculation of capacity of each culvert and determine details of the catchment served
 - Identification of intake structures below current Environment Agency (now Natural Resources Wales) standards, which will need to be upgraded
 - Identification of all owners and their contact details
 - Current condition of each significant culvert
- Identify all features, which act as flood defence structures;
- Survey all channels, which are considered to be significant in terms of flood risk. The surveys will identify details of the construction materials, size and shape of the channel and its condition;
- Survey all culverts, which are considered to be significant in terms of flood risk. The surveys will identify details of the construction materials, size and shape of the culvert and its condition;
- Further survey work and site investigations will be carried out in order to improve the accuracy and completeness of the information available regarding contaminated land;
- Surveys will be carried out to establish what measures will be required in order to provide additional resistance to flood water to Scheduled Ancient Monuments and Historic Listed Buildings;
- A survey will be carried out to identify where leachate is being discharged from refuse tips both current and historic and from cemeteries. The nature of the leachate will be established and its affect on the quality of surface water;
- A survey will be carried out of all groundwater discharges from all mine workings to establish the location and quality of the water;
- A survey will be implemented in order to establish a list of the defences within the Caerphilly County Borough Council area, including details of their construction and condition;



- On completion of the new flood modelling maps being prepared by the Environment Agency (now Natural Resources Wales) plans will be prepared showing the location of invasive species within the areas subject to flood risk.

Benefits:

- To have information available to identify where measures may be required;
- To have information available to design new measures.

Time Scale for Implementation:

- Short Term: 0-20 Years.

Clause 6.17.4: Local Property- Flood Mitigation – Resilience**Preparedness****Detailed Objective: 12**

Caerphilly County Borough Council has a stock of 10,500 houses. A total of 9,300 properties must be upgraded to National Inspection Council for Electrical Installation Contracting (NICEIC) standards over the 7 years from 2013 – 2030. Only the kitchens have to be refurbished on the ground floor. The grants available do not allow for building in flood resilience and other ground floor rooms other than kitchens.

In addition, Caerphilly County Borough Council's offices, schools, sheltered accommodation and other council related buildings will be considered.

The buildings vary in age but none of them have been built to withstand flooding. It is proposed that once the detailed flood modelling has been completed all Caerphilly County Borough Council owned buildings at risk will be identified. When these properties are due for refurbishment two quotations will be obtained, one designed with flood resilience in mind and one designed to "normal" building standards. A cost benefit analysis will then be carried out to decide if the additional cost of building in flood resilience is deemed beneficial in that case. Funding will have to be identified to cover the additional cost of refurbishment of all ground floor rooms and the extra cost of building in resilience.

Where new buildings are planned within areas at risk of flooding Caerphilly County Borough Council will adopt a policy of using building standards which are resilient to water inundation.

Methods of achieving building resilience in flood risk areas may include the following:-

- **Use of flood resilient materials**

Ceramic tiled floors, flood proof skirting, steel kitchens units. Replace chipboard kitchens and bathroom units with plastic, steel or solid wood. Fit water resistant doors and window frames. Replace usual plaster with a more water-resistant version such as lime plaster or cement render. Always use waterproof sealant on external walls and water resistant paint on internal walls. Use denser concrete screeds on concrete floors. Replace insulation with cell insulation which will survive flooding. Install concrete floors instead of timber suspended. Wall joints to be protected by installing a chemical damp proof course below joist level.

- **Use of flood resilient building techniques**

Walls re-plastered up to 1 metre above floor level with water resilient plaster, all main appliances on plinths, kitchens units with base units raised off the ground and raise electrical points and other services above flood level. Use tiled floors with rugs that can be removed easily. Buy airbricks with removable covers – put them on during flood, but remove afterwards to help drying process. Install expensive electric equipment such as boilers upstairs.

Benefits:

- Less damaged will be caused to properties subject to flooding;
- Buildings will be renovated and brought back into use more quickly;
- The overall cost of the building life cycle will be reduced.

Time Scale for Implementation:

- Medium Term: 20 – 50 Years.
- Building in resilience to existing properties will take place as properties are programmed for refurbishment, only when it has been established that they are within an area subject to flood risk. The time scale therefore for all council owned properties to be refurbished is likely to be up to 50 years

Clause 6.17.5: Local Property- Flood Mitigation – Resistance Protection**Detailed Objectives: 1, 2, 3, 4, 12**

Where areas of flood risk are identified giving flood water levels below 600mm in depth then measures will be considered which will prevent the ingress of water into individual properties.

Measures may include portable flood walls, flood guards to doors or the replacement of existing doors with doors with seals which will withstand the depth of water predicted by the modelling. These measures would need to be installed with non-return valves or double-check valves in the foul sewers to prevent flood water entering the properties through the sewer systems.

Benefits:

- To ensure that properties damaged by flooding will be brought back to a habitable state as quickly as possible.

Time Scale for Implementation:

- Short and Medium Term: 0-50 Years.

Clause 6.17.6: Pre-feasibility Studies, Feasibility Studies**Preparedness****Detailed Objective: 16**

When the Flood Risk Management Plans are being prepared various measures will be considered for implementation. At this stage pre-feasibility plans will be carried out which will identify the measures most likely to achieve the desired reduction in flood risk at appropriate cost.

Following this process a much more limited number of measures will be selected for further more detailed feasibility studies.

- | | |
|---------------------------------------|---|
| Benefits: | <ul style="list-style-type: none">• Ensure that the most appropriate measures are put forward for implementation. |
| Time Scale for Implementation: | <ul style="list-style-type: none">• Short Term: 0-20 Years. |

Clause 6.17.7: Project Plans**Preparedness****Detailed Objective: 16**

On completion of the feasibility study referred to in 6.17.6 above each measure will be subjected to appraisal based on the following criteria:

- Does it contribute the Caerphilly County Borough Council high level strategy of reducing flood risk?
- What measurable effect does the measure have on reducing flood risk?
- Is the scheme within a high priority flood risk area?
- Does the cost benefit analysis show the scheme to be value for money?
- Is funding available to implement the scheme?

If the scheme satisfies these conditions then it will be forwarded to the Welsh Government for further appraisal.

Benefits:

- To identify flood risk in a more precise way.
- Allows the preparation of measures to reduce flood risk.

Time Scale for Implementation:

- Short and Medium Term: 0-50 Years.

Appendix 3: Flood Risk Management Plan Geographic Information System Counting Methodology – Overview

Key:

uFMfSW:	updated Flood Map for Surface Water.	SAC:	Special Areas of Conservation.
P:	Flood Return Period In Years.	SPA:	Special Protection Areas.
NoDT:	No Depth Threshold.	RAMSAR:	Conservation And Sustainable Utilisation Of Wetlands.
D:	Flood Depth.	WHS:	World Heritage Sites.
NRD:	National Receptors Dataset.	SSSI:	Sites of Special Scientific Interest.
PPL:	Property Points Layer.	SAM:	Scheduled Ancient Monuments.
EPR:	Environmental Permitting Regulations.	SINC:	Sites of Interest for Nature Conservation.

Risk To People:

Total Number Of Residential Properties:	Based on the uFMfSW - Property Points' dataset, all properties classified as "dwelling" or "manse".
Total Number Of People:	Total number of properties x 2.35
Numbers Of Residential Properties In Areas At Risk:	Based on the uFMfSW - Property Points' dataset, residential properties where P30_NoDT>0.5 (High risk), P100_NoDT>0.5 (Medium risk), P1000_NoDT>0.5 (Low risk). Counts have been subtracted as appropriate to provide the number within each risk band.
Numbers Of People In Areas At Risk:	Number of properties as defined above x 2.35
Numbers Of Residential Properties At Risk:	Based on the uFMfSW - Property Points' dataset, residential properties where P30_D200>0.5 (High risk), P100_D200>0.5 (Medium risk), P1000_D200>0.5 (Low risk). Counts have been subtracted as appropriate to provide the number within each risk band.
Numbers Of People At Risk:	Number of properties as defined above x 2.35
Total Number Of Services:	Based on NRD_PPL dataset. Sum of points located within the relevant boundary. The property classifications have been included as detailed in "Vulnerable Services List v2.xlsx".
Number Of Services In Areas At Risk:	Based on NRD_PPL dataset. Sum of points located within the uFMfSW 30, 100 and 1000 year flood extents as appropriate. Counts have been subtracted as appropriate to provide the number within each risk band. The property classifications have been included as detailed in "Vulnerable Services List v2.xlsx".

Risk To Economic Activity:

Total Number Of Non-Residential Properties:	Based on the uFMfSW - Property Points' dataset, all properties not classified as dwelling or manse.
Numbers Of Non-Residential Properties In Areas At Risk:	Based on the uFMfSW - Property Points' dataset, non-residential properties where P30_D200>0.5 (High risk), P100_D200>0.5 (Medium risk), P1000_D200>0.5 (Low risk). Counts have been subtracted as appropriate to provide the number within each risk band.
Airports:	There are no airports within Caerphilly County Borough Council area.
Total Length Of Primary/Trunk Roads:	Based on NRD_roads dataset. Total length of road (km) within the appropriate boundary classified as Primary/Trunk road.
Length Of Primary/Trunk Roads At Risk:	Based on NRD_roads dataset. Total length of road (km) which intersects the uFMfSW 30, 100 and 1000 year flood extents.
Total Length Of Main Line Railway:	Based on NRD_railways dataset. Total length of railway (km) within the appropriate boundary.
Length Of Main Line Railway At Risk:	Based on NRD_railways dataset. Total length of railway (km) which intersects the uFMfSW 30, 100 and 1000 year flood extents.
Total Area Of Agricultural Land:	Based on National Receptor Dataset Agricultural land classification, total area classified as grade 1, 2 or 3 within the appropriate boundary. Note there is some minor double counting where the features in the source dataset overlap.
Total Area Of Agricultural Land At Risk:	Based on National Receptor Dataset Agricultural land classification, total area classified as grade 1, 2 or 3 which intersects the uFMfSW 30, 100 and 1000 year flood extents.

Risk To Natural and Historic Environment:

Bathing Waters:	There are no identified sites within the Caerphilly County Borough Council area.
Total Number Of EPR Installations:	Based on the Active EPR Industrial and EPR Waste datasets provided by Caerphilly County Borough Council. Sum of points contained within each boundary.
Number Of EPR Installations At Risk:	Sum of points which intersect the uFMfSW 30, 100 and 1000 year flood extents.
Total Area Of SAC:	Based on the SAC dataset downloaded from Natural Resources Wales. Total area within the relevant boundary.
Area Of SAC At Risk:	Sum of areas which intersect the uFMfSW 30, 100 and 1000 year flood extents.
SPA/RAMSAR/WHS:	None identified within the Caerphilly County Borough Council area.
Total Area Of SSSI:	Based on the SSSI dataset downloaded from Natural Resources Wales. Total area within the relevant boundary.
Area Of SSSI At Risk:	Sum of areas which intersect the uFMfSW 30, 100 and 1000 year flood extents.
Total Area Of Parks & Gardens:	Based on the National Receptor Dataset/Country Parks, Historic Parks & Gardens in Caerphilly County Borough Council and Registered Parks & Gardens in Caerphilly County Borough Council datasets. Total area within the relevant boundary.
Area Of Parks & Gardens At Risk:	Sum of areas which intersect the uFMfSW 30, 100 and 1000 year flood extents.
Total Area Of SAM:	Based on the National Receptor Dataset/SAM dataset. Total area within the relevant boundary.
Area Of SAM At Risk:	Sum of areas which intersect the uFMfSW 30, 100 and 1000 year flood extents.
Total Number Of Listed Buildings:	Based on the Listed Buildings in Caerphilly County Borough Council dataset. Total number within the relevant boundary.
Number Of Listed Buildings At Risk:	Number of points within the relevant uFMfSW 30, 100 and 1000 year extents.

Risk To Natural and Historic Environment /Cont'd...:

Total Number Of Licensed Abstractions:	Based on the licensed abstractions dataset provided by Natural Resources Wales. Total number of points within the relevant boundary.
Number Of Licensed Abstractions At Risk:	Sum of points that intersect the uFMfSW 30, 100 and 1000 year flood extents.
Total Area Of SINC:	Based on the Caerphilly County Borough Council SINC _s _Adopted dataset. Total area within the relevant boundary. Note there is some minor double counting where the features in the source dataset overlap
Area Of SINC At Risk:	Sum of areas which intersect the uFMfSW 30, 100 and 10000 year flood extents

Appendix 4: Glossary of Terms

<u>A</u>	Act:	A Bill approved by both the House of Commons and the House of Lords and formally agreed to by the reigning monarch (known as Royal Assent).
<u>B</u>	Bill:	A proposal for new law or a proposal to change an existing law that is presented for debate before Parliament.
<u>C</u>	Catchment:	An area that serves a river with rainwater that is every part of land where the rainfall drains to a single watercourse is in the same catchment.
	Climate Change:	The change in average conditions of the atmosphere near the earth's surface over a long period of time.
	Coastal Erosion:	The wearing away of the coastline, usually by wind and/or wave action.
	Culvert:	A covered structure under road, embankment etc to direct the flow of water.
<u>D</u>	Defences:	A Structure that is used to reduce the probability of floodwater or coastal erosion affecting a particular area.
	DG5	A level of service indicator which examines water companies performance in respect of internal sewer flooding of properties.
	Draft Bill:	A Bill published in draft before introduction before Parliament.
	Drainage Authorities:	Organisations involved in water level management, including Internal Drainage Boards, the Natural Resources Wales and Regional Flood and Coastal Committees.

F Flood and Coastal Erosion Risk Management Function:	Defined by Sections 4 and 5 of the Flood and Water Management Act 2010 as being a function, which may be exercised by a risk management authority for a purpose connected with either flood risk management or coastal erosion.
Flood:	Any case where land not normally covered with water becomes covered by water.
Flood and Water Management Act 2010:	An Act of Parliament updating and amending legislation to provide for better, more comprehensive management of flood risk for people, homes and businesses, helps safeguard community groups from unaffordable rises in surface water drainage charges, and protects water supplies to the consumer
Flood Risk:	Product of the probability of flooding occurring and the consequences when flooding happens.
Flood Risk Management:	The activity of understanding the probability and consequences of flooding, and seeking to modify these factors to reduce flood risk to people, property and the environment. This should take account of other water level management and environmental requirements, and opportunities and constraints.
Flood Risk Management Measures:	The way in which flood risks are to be managed.
Flood Risk Regulations 2009	Regulations which transpose the EC Flood Directive (Directive 2007/60/EC on the assessment and management of flood risks) into domestic law and to implement its provisions.
Floodline Warnings Direct:	Is a free service that provides flood warnings by telephone, mobile, email, SMS text message and fax.
G Groundwater:	Water held underground in the soil or in pores and crevices in rock.
Groundwater Flooding:	Occurs when water levels in the ground rise above the natural surface. Low lying areas underlain by permeable strata are particularly susceptible.
H Habitats Regulations Assessment:	The conservation of Habitats and Species Regulations (S1 490, 2010), Termed the 'Habitats Regulations' implements the European Union 'Habitats Directive (Directive 92/43/ECC) on the Conservation of natural habitats and of wild flora and fauna and certain elements of the 'Birds Directive' (2009/147/EC). This legislation provides the legal framework for the protection of habitats and species of European importance in Wales.
I Internal Drainage Board:	Independent statutory bodies responsible for land drainage in areas of special drainage need in Wales and England. They are long established bodies operating predominately under the Land Drainage Act 1991 and have permissive powers to undertake work to secure drainage and water level management of their districts.

<u>L</u>	Lead Local Flood Authority:	The appropriately appointed County Council or County Borough Council.
	Local Flood Risk:	Defined within the Flood and Water Management Act 2010 as including surface water runoff, groundwater and ordinary watercourses.
	Local Flood Risk Strategy:	Required in relation to Wales by Section 10 of the Flood and Water Management Act 2010. Local flood risk strategies are to be prepared by Lead Local Flood Authorities and must set out how they will manage local flood risk within their areas.
<u>M</u>	Main River:	A watercourse shown as such on the main river Map, and for which the Natural Resources Wales has responsibilities and powers.
	Main River Map:	The definitive map showing which watercourse has been classified as a main river.
<u>N</u>	National Strategy:	The “National Strategy for the Flood and Coastal Erosion Risk Management Wales” produced by the Welsh Government in response to the requirement under Section 8 of the Flood and Water Management Act 2010.
<u>O</u>	Ordinary Watercourse:	All watercourses that are not designated main river, which are the responsibility of Local Authorities or, where they exist Internal Drainage Boards.
<u>R</u>	Reservoir:	An artificial lake where water is collected and stored until needed. Reservoirs can be used for irrigation, recreation, providing water municipal needs, hydroelectric power or controlling water flow.
	Resilience:	The ability of the community, services, area or infrastructure to avoid being flooded, lost to erosion or to withstand the consequences of flooding or erosion taking place.
	Regional Flood and Coastal Committee:	Regional Flood and Coastal Committee - A Natural Resources Wales committee, responsible for consenting medium and long term plans and operational plans to NRW’s Board and Head Office. Monitors and reports on progress. In Wales the Regional Flood and Coastal Committee is the Flood Risk Management Wales Group.
	Risk:	Measures the significance of a potential event in terms of likelihood and impact. In the context of the Civil Contingencies Act 2004, the events in question are emergencies.
	Risk Management:	Anything done for the purpose of analysing, assessing and reducing a risk.

R Risk Management Authority:	A Welsh risk management authority is defined in Section 6 of the Flood and Water Management Act 2010 as the Natural Resources Wales, a Lead Local Flood Authority, a district for an area for which there is no unitary authority, an Internal Drainage Board for an internal drainage district that is wholly or mainly in Wales and a water company that exercises functions in relation to an area in Wales.
Risk Management Schemes:	A range of actions to reduce flood frequency and/or the consequences of flooding to acceptable or agreed levels.
River Flooding:	Occurs when water levels in a river channel overwhelms the capacity of the channel.
S Strategic Environmental Assessment:	A legal requirement in the UK for certain plans and programmes stipulated by the Strategic Environmental Assessment Directive. It is implemented in Wales by the Environmental Assessment of Plans and Programmes (Wales) Regulations 2004 (SI 2004NO. 1656, WI70). The purpose of Strategic Environmental Assessment is to provide for a high level of protection of the environment, ensure the integration of environmental considerations into the preparation and adoption of plans and programmes, and to contribute to the promotion of sustainable development and environment protection.
Sewer:	An artificial conduit, usually underground, for carrying of sewage (a foul sewer) or rainwater (a storm sewer) or both (a combined sewer).
Surface Water Flooding:	In the urban context, usually means that surface water runoff rates exceed the capacity of drainage systems to remove it. In the rural context, it is where surface water runoff floods something or someone.
Surface Water Runoff:	This occurs when the rate of rainfall exceeds the rate that water can infiltrate the ground or soil.
Sustainable Drainage Systems (SuDS):	Helps to deal with excesses of water by mimicking natural drainage patterns.

I	Technical Advice Note 15: Development And Flood Risk:	TAN 15 supports Planning Policy Wales and makes it clear how local authorities should make decisions about different types of development on flood plains, providing clear tests for justification and acceptability of flooding consequences, and enabling the consideration of risks over the lifetime of the new development.
W	Watercourse:	A channel natural or otherwise along which water flows.
	Water Company:	A company which hold an appointment under Chapter 1 of Part 2 of the Water Industry Act 1991 or a licence under Chapter 1A of Part 2 of that Act.
	Welsh Local Government Association:	Represents the interests of Local Authorities in Wales. The three fire and rescue authorities, four police authorities and three national park authorities are associate members.

Appendix 5 Components of the Flood Risk Management Plan as Detailed in the Flood Risk Regulations 2009 – Part 4

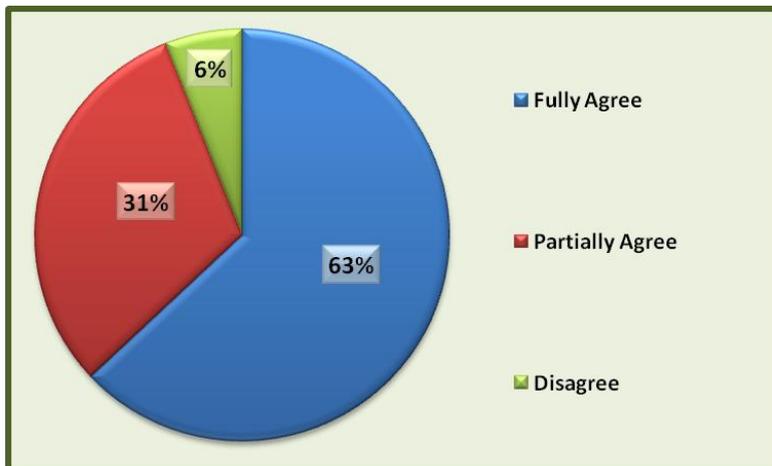
- Each Lead Local Flood Authority has a duty to prepare a Flood Risk Management Plan in relation to each relevant Flood Risk Area.
- Natural Resources Wales must review the Flood Risk Management Plan and may recommend modifications.
- Each Flood Risk Management Plan must include the following:
 - > Objectives for the purpose of managing flood risk.
 - > Measures for achieving the objectives.
 - > Objectives must be set to reduce the adverse consequences of flooding for;
 - human health,
 - economic health, or
 - the environmental (including cultural heritage), and
 - reducing the likelihood of flooding, whether by exercising powers to carry out structural work or otherwise.
 - > Measures must include measures for;
 - prevention of flooding,
 - protection of individuals, communities and the environment against the consequences of flooding, and
 - arrangements for forecasting and warning.
 - > Measures must have regard to;
 - the cost and benefits of different methods of managing flood risk,
 - the information included in the flood hazard maps and the flood risk maps,
 - the river basin management plan for the area,
 - the effect of floodplains that retain flood water,
 - the environmental objectives,
 - the likely effect of a flood, and of different methods of managing a flood, on the local area and the environment.
 - > The Flood Risk Management Plan must include;
 - a map showing the boundaries of the flood risk area,
 - a summary of the conclusions drawn from the flood hazard maps and the flood risk maps,
 - a description of the proposed timing and manner of implementing the measures, including details of the bodies responsible for implementation,
 - a description of the way in which implementation of the measures will be monitored
 - a report of the consultation, and
 - details of the co-ordination between the measures in the Flood Risk Management Plan and the river basin management plan.

- Caerphilly County Borough Council must consult with the following about the proposed content of the Flood Risk Management Plan:
 - > The following authorities;
 - Other Lead Local Flood Authorities,
 - Dŵr Cymru Welsh Water,
 - The Reservoir Undertaker,
 - CADW,
 - Natural Resources Wales – division dealing with Countryside Council of Wales responsibilities,
 - The Welsh Ministers,
 - The Public.
- Lead Local Flood Authorities must have regard to any guidance issued by Natural Resources Wales about the form of the Flood Risk Management Plan.
- Lead Local Flood Authorities must complete a review their Flood Risk Management Plan:
 - > First review by 22nd June 2021,
 - > Subsequent reviews must be carried out at intervals of no more than 6 years,
 - > Following a review Lead Local Flood Authorities must prepare a revised Flood Risk Management Plan which must;
 - take account of the likely impact of climate change on the occurrence of floods,
 - include an assessment of the progress made towards implementing the measures,
 - If the measures included in the previous Flood Risk Management Plan have not been implemented, include a statement of the reasons why those measures have not been implemented.

Appendix 6 Public Consultation - Survey Questions; Results and Comments Received

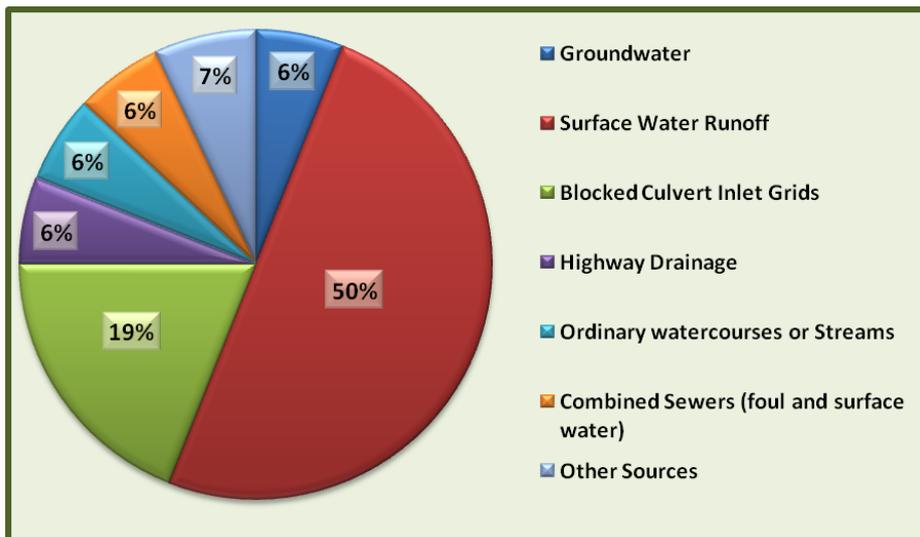
Q1. The draft Flood Risk Management Plan sets out the most significant flood risk in the Caerphilly County Borough. Do you

- Fully Agree Partially Agree Disagree



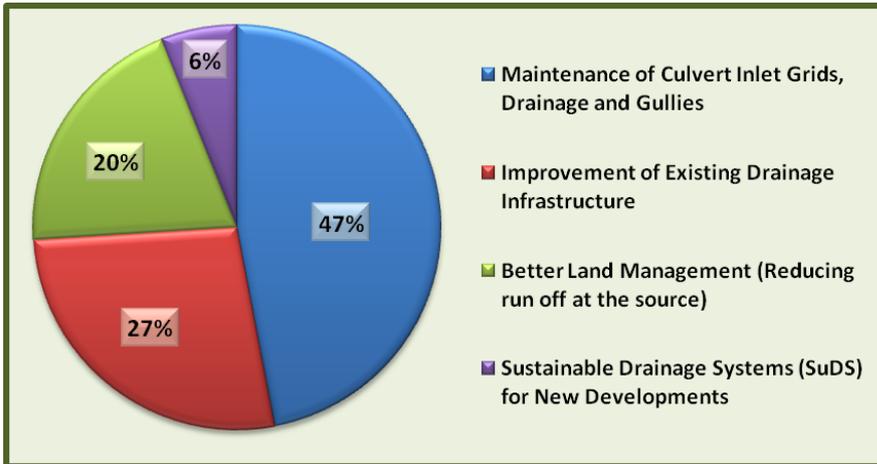
Q2. What do you consider to be the greatest cause of flood risk in the Caerphilly County Borough?

- | | |
|--|--|
| <input type="checkbox"/> Ground water | <input type="checkbox"/> Surface water run off |
| <input type="checkbox"/> Blocked culvert inlet grids | <input type="checkbox"/> Highway drainage |
| <input type="checkbox"/> Ordinary water courses or streams (<i>not rivers</i>) | <input type="checkbox"/> Drainage channels |
| <input type="checkbox"/> Combined sewers (<i>Foul and surface water</i>) | <input type="checkbox"/> Other |



Q3. What do you consider to be the highest priorities for managing flood risk in the Caerphilly County Borough? (Please select 2 options)

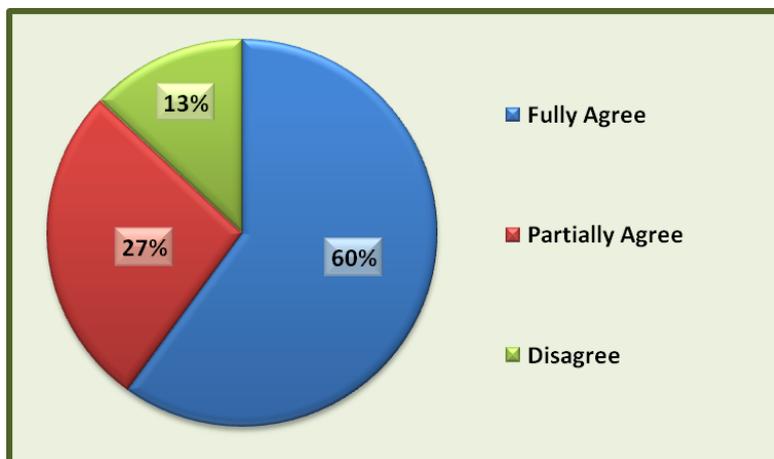
- Maintenance of culvert inlet grids, drainage channels and gullies
- Improvement of existing drainage infrastructure
- Construction / Improvement of flood defence systems
- Sustainable drainage systems (SuDS) for new developments
- Better land management (reducing run off at the source)
- Other



Q4. Do you feel that this draft Flood Risk Management plan effectively targets and aims to achieve the objectives set out by Welsh Governments National Flood and Coastal Erosion Risk Management strategy (FCERM) of:

1. Reducing consequences
2. Raising awareness and engaging people
3. Providing an effective and sustained response
4. Prioritising investment.

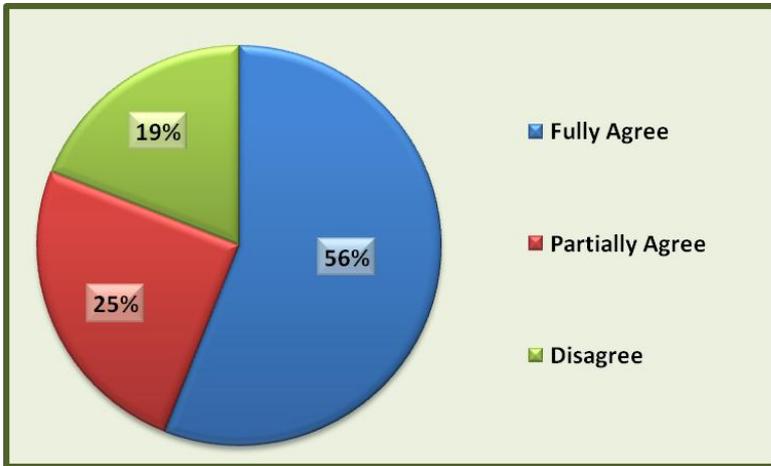
- Fully Agree
- Partially Agree
- Disagree



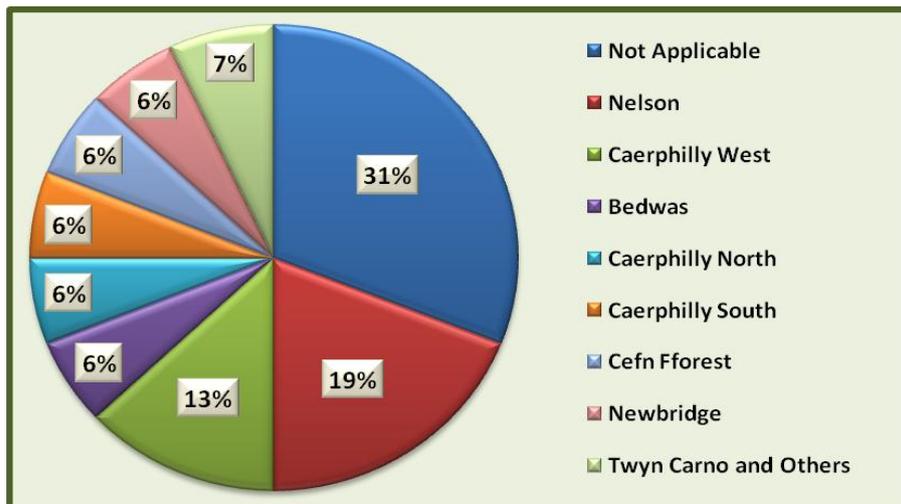
Q5. The draft Flood Risk Management Plan describes four categories of measures

1. *Prevention* 2. *Protection* 3. *Preparedness* 4. *Recovery and Review*
 Do you feel the measures contained within the draft Flood Risk Management Plan satisfactorily address these categories?

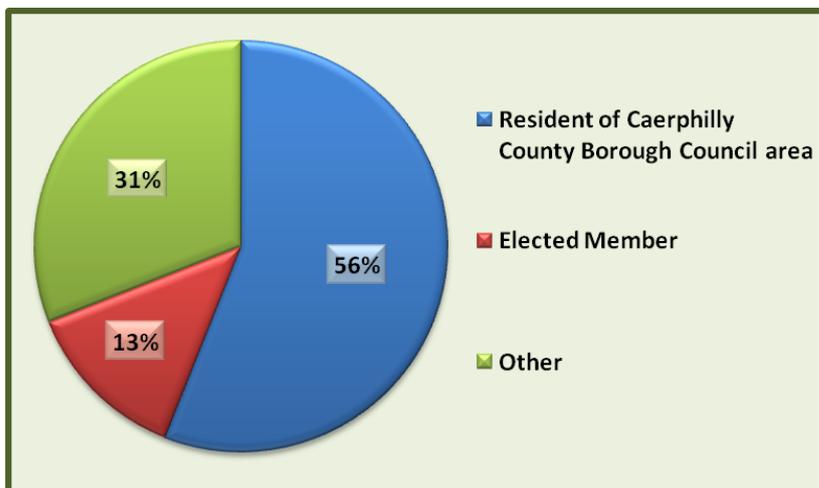
Fully Agree Partially Agree Disagree



In which area of Caerphilly County Borough do you live?



Which Organisation or Group do you represent?



Consultee:

Risca Town Council

Date comments made:

24th July 2015

Comment Number	Comment Made	Caerphilly County Borough Council Response
1.1	I have a few comments that are required to be immediately corrected in the Report: Fernlea area in your report is stated as in Risca East. In fact, according to CCBC, Fernlea is part of Risca West not East! Both at County and Community representation level.	Agreed: However the “Fernlea” mention on page 248 of the plan refers to a culvert intake structure known locally as the “Fernlea culvert” which is located in the East community area.
1.2	In the Report, you refer to Clyde Road; this is incorrect. As the Town Councillor for Lower Pontymister and resident of Clyde STREET, another correction required.	Agreed: The text has been amended on page 258 of the Flood Risk Management Plan.
1.3	In the appendices, you refer to Town and Community Councils, this is incorrect. CCBC’s own website list 18; the two missing are Risca Town Council and Risca East Community Council. This is the second time you have omitted consultation with specifically with Risca Town (formerly Risca West) Council and therefore an action point.	Agreed: The missing Town Council and community council will be added to Appendices. However, Risca Town Council and Risca East Community Council were sent an email on the 13 th July informing them of the consultation.

Consultee:

Nelson Community Council

Date comments made:

12th August 2015

Comment Number	Comment Made	Caerphilly County Borough Council Response
2.1	<p>Having looked at the consultation on Caerphilly County Borough Councils draft flood risk management plan, and after reviewing the consultation and the questions set out by the consultation, my members feel that they are neither qualified to answer this document or have the time to review the document as a whole and can only make comment on areas of concern within Nelson.</p> <p>Therefore the main areas of concern have been outlined as follows:</p> <p>An area which has been brought the Council's attention on many occasions is Shingrig Road. During periods of heavy rain the combined drainage systems underneath the roads seem totally inadequate and brown water, considered by many to possibly be sewerage, runs down the road.</p>	<p>In accordance with the Flood Risk Regulations 2009, the Caerphilly County Borough Council Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Therefore flooding from combined drainage systems has not been considered as part of this plan. Dŵr Cymru Welsh Water is the responsible authority for combined drainage systems that cause flooding within the County Borough Council area. However in our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)</p> <p>Noted:</p>
2.2	<p>The area by the Rowan Tree public house floods almost every year causing traffic chaos.</p>	<p>Agreed: Community Area Measures are included in pages 308 – 382 in the Flood Risk Management Plan to deal with these issues.</p>
2.3	<p>The area between the Co-op and the Railway Inn, on Mabon Road, floods almost every year causing traffic chaos.</p>	<p>Agreed: Community Area Measures are included in pages 308 – 382 in the Flood Risk Management Plan to deal with these issues.</p>
2.4	<p>The area at the bottom of the second rugby pitch at Maes yr Onen gets waterlogged and some gardens flood, this has occurred since the building of the housing site on the Bwl Road.</p>	<p>Noted: Community Area Measures are included in pages 308 – 382 in the Flood Risk Management Plan to deal with these issues.</p>
2.5	<p>The backs of the houses along Ashgrove get waterlogged and some gardens flood, this has occurred since the building of the housing site known as High Close.</p>	<p>Noted: Community Area Measures are included in pages 308 – 382 in the Flood Risk Management Plan to deal with these issues.</p>

Comment Number	Comment Made	Caerphilly County Borough Council Response
2.6	It must be understood by both the Council and the Water Company that Nelson is an 'old community'. The Nelson Main Sewer was built circa 1895 and is a combined rain water run-off and sewerage main. Consequently, the Housing Development, which has taken place in Nelson over the past 45 years or so, has outgrown its capacity.	Noted: In accordance with the Flood Risk Regulations 2009, the Caerphilly County Borough Council Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Therefore flooding from main sewers has not been considered as part of this plan. Dŵr Cymru Welsh Water is the responsible authority for main sewers that cause flooding within the County Borough Council area. However in our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)
2.7	This Main Sewer apparently meets the Merthyr Trunk Sewer at Fiddler's Elbow. How big is this pipe and can it cope with any further development, without being upgraded by the Water Company?	Noted: In accordance with the Flood Risk Regulations 2009, the Caerphilly County Borough Council Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Therefore flooding from trunk sewers has not been considered as part of this plan. Dŵr Cymru Welsh Water is the responsible authority for trunk sewers that cause flooding within the County Borough Council area. However in our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)

Consultee:

Natural Resources Wales (Head Office)

Date comments made:

21st August 2015

Comment Number	Comment Made	Caerphilly County Borough Council Response
3.1	<p>A map showing the boundaries of the Flood Risk Area. The FRMP contains the following maps showing the boundaries of the Flood Risk Area:</p> <ul style="list-style-type: none"> Figure 2, study area map on page 5. Figure 3, map of Caerphilly flood risk area on page 15. Figure 4, the Borough map with wards on page 20. <p>Further maps which also show the flood risk area and what is at risk on pages 60-62.</p> <p>Meets the requirements.</p>	Agreed: No response required.
3.2	<p>The conclusion drawn from the flood hazard and risk maps published under Regulations 22 of the Flood Risk Regulations 2009.</p> <p>The report contains stats tables on pages 18-19 and summary conclusions on page 45. Further stats are included in Table 5 on page 46.</p> <p>More detailed conclusions are included for each community area which summarises the main flood risk and what and where is most at risk of flooding.</p> <p>Meets the requirements.</p>	Agreed: No response required.
3.3	<p>Objectives for the purpose of managing the flood risk.</p> <p>Objectives are included in section 5.3, pages 39 and 40 and are linked to social, economic and environment on pages 42 and 43.</p> <p>Meet the requirements.</p>	Agreed: No response required.

Comment Number	Comment Made	Caerphilly County Borough Council Response
3.4	<p>Proposed measures for achieving those objectives, and description of proposed timings and manner of implementing the measures including details of who is responsible for implementation.</p> <p>Proposed measures for achieving objectives start in section 6.1, page 47 until page 57 for Borough wide measures. More specific measures are included for each community at risk of flooding. Measures include all relevant information to meet the EU requirements.</p> <p>Meets the requirements.</p>	Agreed: No response required.
3.5	<p>A description of the way implementation of measures will be monitored is included within section 9.</p> <p>The FRMP will be reviewed formally after 6 years for Europe. In each December, current position regarding implementation of each measure will be monitoring.</p> <p>Meets the requirements.</p>	Agreed: No response required.
3.6	<p>Consultation This needs to be completed after completion of the consultation but current content in section 8 looks good.</p>	Agreed: Section 8 has been completed and a report on the consultation and outcomes included.
3.7	<p>Where the person preparing the report thinks it appropriate, information about how the implementation of measures under the flood risk management plan and the river basin management plan for the area will be co-ordinated at a river basin level.</p> <p>A summary is contained in section 4.3 with the Borough measures within section 6.1 linked to the appropriate RBMP measures. This meets the requirements but as a suggestion, the link to the RBMP could be furthered strengthened through linking the objectives to the RBMP (for example, the sub-objective under overarching objective 1 and 3 will contribute towards WFD delivery).</p>	Noted: No action required

Comment Number	Comment Made	Caerphilly County Borough Council Response
3.8	<p>How were the SEA and HRA requirements considered and met?</p> <p>Pages 38 and 39 contain information from the current SEA on the approach to selecting measures for delivery.</p> <p>Page 57 contains a statement as follows:</p> <p>All the detailed objectives and measures contained in this Flood Risk Management Plan were included in the Strategy and therefore the Strategic Environmental Assessment and Habitat Regulations Assessments, which was prepared for the Strategy, is still valid. It has not been considered necessary to review the Strategic Environmental Assessment or Habitat Regulations Assessment. No physical work will be constructed on site as part of this Flood Risk Management Plan but investigative work may highlight works necessary. Should that be the case a review of the Strategic environmental Assessment will be carried out on a site by site basis. Therefore this meets the requirements but it is suggested that the existing SEA is referenced (insert link in the report).</p>	<p>Noted: A link to the Strategic Environmental Assessment to be inserted into page 57 of the Flood Risk Management Plan</p>

Consultee:

Natural Resources Wales (Framework Directive Team)

Date comments made:

21st August 2015

Comment Number	Comment Made	Caerphilly County Borough Council Response
4.1	<p>Good to see the document is linked to the Severn River Basin Management Plan under the following sections: Page 30 Section 4 Coordination with Severn RBMP. Page 32 links to RBMP (Note ½ page is duplicated). Page 33 has a list of linked measures in this flood plan and the RBMP. Page 34 Makes link with Welsh Government Objectives of this plan with WFD.</p>	Noted: No response required.
4.2	<p>With regards specific actions that could show WFD benefits: Page 8 talks about groundwater and potential mine water investigations and measures. We'd like to be informed of any such cases.</p> <p><i>The flood management plan will allow for investigations of the location of mine water flows and their likely volume, if there is evidence to indicate that such flows could present a flood risk.</i></p> <p><i>It is also common for mine water to be coloured red, which is usually a sign that the water is ferruginous meaning that it contains iron salts, which are detrimental to the quality of the watercourse below the discharge point. It is proposed that, if required, measures will be introduced what will remove the iron salts from the mine water and thus improve the quality of the water downstream of the discharge.</i></p>	Agreed: No response required.
4.3	<p>Limiting surface water runoff: <i>Runoff will be altered if an area is subject to new development such as housing. Although the total runoff is likely to increase, controls will be imposed to restrict the maximum rate runoff from these developments to a level no greater than greenfield runoff or existing discharge rates where appropriate.</i></p>	Agreed: No response required.

Comment Number	Comment Made	Caerphilly County Borough Council Response
4.4	<p>And the measures to reduce potential impact from Highway drainage: <i>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 flush of runoff. The Flood Risk Management will look at the possibility of installing measures such as swales and red beds that will reduce velocities and improve water quality.</i></p>	Agreed: No response required.
4.5	<p>Page 9 talks about sensitive channel vegetation maintenance practices which can benefit water quality. <i>Flooding within channels is usually caused by lack of maintenance. Where channels are in the ownership of Caerphilly County Borough Council operational procedures are in place to ensure that the capacity of the channels is not impaired. Inspection of channels, where there is significant risk of flooding, is carried out on a regular basis and debris is removed. The grass is not usually cut as this is helpful in the reduction of pollution. Trees and shrubs are not usually removed as their root system often helps to stabilise the ditches. However, where flows are impeded trees and shrubs will be cut back as appropriate.</i></p>	Agreed: No response required.
4.6	<p>Page 10 talks about working with DCWW and ourselves with regards issues around combined sewers. Currently this working ok and we obviously like that to continue.</p>	Agreed: No response required.
4.7	<p>Not the Highlighted 'quality – presumably they mean 'quantity'. Caerphilly County Borough Council will work collaboratively with our partners Natural Resources Wales and DCWW to identify all combined sewer overflows and to establish their efficiency and the quality of water being discharged. Where necessary, Caerphilly County Borough Council will work with Natural Resource Wales and DCWW to introduce measures which will reduce the 'quality' of foul sewerage being discharged from the combined sewer system into surface water systems.</p>	Agreed: Text amended on page 10 of the Flood Risk Management Plan.

Comment Number	Comment Made	Caerphilly County Borough Council Response
4.8	<p>Page 40 talks about creating 'natural' channels and has a picture next to it of what they refer to as a matured drainage channel'</p> <p>This appears to be a concrete and stone channel with a bit of grass. This is not what we'd class as a 'natural channel' with minimal modifications.</p>	Agreed: Title of the photo on Page 40 to be changed.
4.9	Page 480 – Talks about SuDs, note difficulties ref SuDs due to adoption issues.	Agreed: No response required.
4.10	Page 488 Clause 6.15.1: Land Management – Talks about work with landowners and minimising potential negative impacts from forestry and agriculture.	Agreed: No response required.
4.11	<p>Page 500 Clause 6.17.1: Investigations – Again talks about minewater investigations, also tip leachate investigations, both of which we'd be interested in seeing the results from.</p> <p>A survey will be carried to identify where leachate is being discharged from refuse tips both current and historic and from cemeteries. The nature of the Leachate will be established and its effect on the quality of surface water; A survey will be carried out of all groundwater discharges from all mine workings to establish the location and quality of water;</p>	Agreed: No response required.

Consultee:		Natural Resources Wales (Planning Team)
Date comments made:		21 st August 2015
Comment Number	Comment Made	Caerphilly County Borough Council Response
5.1	Minor errors in the document: Page 14 - should state water abstraction licences rather than water extraction.	Agreed: Text amended on page 14 of the Flood Risk Management Plan.
5.2	Page 44 - reservoirs are subject to discharge consents not discharge licences.	Agreed: Text amended on page 44 of the Flood Risk Management Plan.
5.3	Nearby Licences Is the licence data used in the 'counts' in the plan from NRW or Local Authority records? Local Authorities have records of unlicensed private domestic water supplies which NRW do not have access to. Need to ensure data has been used from both sets of data.	Noted: CCBC drainage officers to Liaise further with CCBC Environmental Health Officers on this issue.
5.4	Deregulated Licence Licences were deregulated in 31 st March 2005. Deregulated licences include any abstraction of less than 20 cubic metres per day from surface water source (e.g. stream or drain) or from underground strata (via borehole or well) for any particular purpose. It is possible that there are other unlicensed abstractions present, particularly for domestic and / or agricultural use. Or that deregulated licences known before 31 st March 2005 are now no longer active. Certain private water supplies do not require a licence; therefore Natural Resources Wales is not necessarily aware of existence. The locations of private domestic sources may be held by the local authority on a register required by the Private Water supplies Regulations 1992.	Noted: CCBC drainage officers to Liaise further with CCBC Environmental Health Officers on this issue.

Comment Number	Comment Made	Caerphilly County Borough Council Response
5.5	<p>Licences affected by flooding</p> <p>Consideration should be given to abstraction licences identified as being subject to flood risk, surveys and reports should be carried out to identify the potential damaging effects of flooding and what measures could be implemented to reduce the flood risk and impact on the water. We would need to know if there are any licences likely to be affected by flooding or any of the measures outlined.</p>	Noted: No response required.
5.6	<p>New licences required for flood defence measures</p> <p>We would also need to know if there are flood defences activities or any new flood defence measures that might require an abstraction licence – temporary or full ie. Dust suppression for construction of new flood defences. The same would apply to the potential requirement for any impoundment licences. A licence from Natural Resources Wales may be required for these activities.</p>	Noted: No response required.
5.7	<p>Licence requirements – abstraction</p> <p>If more than 20 cubic metres of water is to be abstracted per day from a surface water source (e.g. stream or drain) or from underground strata (via borehole or well for any particular purpose, then an abstraction licence from Natural Resource Wales is likely to be required. There is no guarantee that a licence will be granted as this is dependent on available water resources and existing protected rights. Abstractions from these sources under 20 cubic metres per day not required an abstraction licence.</p>	Noted: No response required.
5.8	<p>Licence requirement – impoundments</p> <p>If a watercourse, ditch or stream is to be impounded then an impounding licence is likely to be required from Natural Resources Wales.</p>	Noted: No response required.

Comment Number	Comment Made	Caerphilly County Borough Council Response
5.9	<p>Small impounding structures policy</p> <p>There may be opportunity for any works to come under our low-risk impounding policy, guidance note is available on our website.</p> <p>However in addition to the statutory exceptions, there may be occasions when an impounding licence is not necessary. Taking a risk based approach, it was established through interpretation and practice that it is not necessary to require a licence for works, provided that they:</p> <ul style="list-style-type: none"> • Do not raise the upstream water level outside the normal (that is under non-flood conditions) wetted perimeter of the stream ; and • Do not temporarily or permanently modify the flow regime in a way that is potentially detrimental to other interests or the environment. 	Noted: No response required.

Consultee:		Natural Resources Wales (Flood Risk Analysis)
Date comments made:		21 st August 2015
Comment Number	Comment Made	Caerphilly County Borough Council Response
6.1	<p>Question 1. Do you agree or disagree that the Draft Flood Risk Management Plan sets out the most significant flood risk in Caerphilly County Borough? Please select one option.</p> <p>Fully Agree</p> <p><u>Please give reasons for your answer</u></p> <p>The FRMP overall is well structured and presented throughout, which for the reader does help clearly establish those sites which are at significant risk. The summaries which provide the total cost of measures for each community area especially the summary on page 58 "Total Cost of Measures for the Caerphilly County Borough Council Flood Risk Area is a very useful indicator on those specific areas which have the greatest risk and corresponding costs to remedy flood risk within these locations.</p>	Agreed: No response required.
6.2	<p>Question 2. What do you consider to be the greatest cause of flood risk in Caerphilly County Borough? Please select one option.</p> <p>Blocked culvert inlet grids</p>	Noted: No response required.
6.3	<p>Question 3. What do you consider to be the highest priority for managing flood risk in Caerphilly County Borough? Please select one option.</p> <p>Maintenance of culvert inlet grids, drainage channels and gullies.</p>	Noted: No response required.
6.4	<p>Question 4. Do you agree or disagree that this draft Flood Risk Management plan effectively targets and aims to achieve the objectives set out by Welsh Government National Flood and Coastal Erosion Risk Management Strategy (FCERM).</p> <p>Fully agree</p> <p><u>Please give reasons for your answer</u></p> <p>These targets have been developed by Welsh Government in consultation with the Risk Management Authorities (RMAs) to deliver a structured approach to Flood Risk Management for the future.</p>	Agreed: No response required.

Comment Number	Comment Made	Caerphilly County Borough Council Response
6.5	<p>Question 5. Do you agree or disagree that the measures contained within the Draft Risk Management Plan satisfactorily address these categories? <i>Please select one option.</i></p> <p>Fully agree</p> <p><u>Please give reasons for your answer</u></p> <p>The measures have previously been further developed from the Local Flood Risk Management Strategy which was a requirement of the National Strategy above. These measures provide a good steer to LLFAs on which ones are appropriate to use in delivering the desired outcomes of the FRMP to manage flood risk in their specific catchment areas.</p>	Agreed: No response required.
6.6	<p>Question 6. How do you think, as an individual/organisation can support the work set out in the Draft Flood Risk Management Plan to reduce flood risk?</p> <p>By working in partnership with other RMAs in delivering schemes which in some instances will deliver benefits from various sources of flooding. This is a better use of resources and funding can result in scheme being more cost beneficial and deliverable.</p>	Agreed: No response required.

Consultee:
Date comments made:

Dŵr Cymru Welsh Water
24th August 2015

Comment Number	Comment Made	Caerphilly County Borough Council Response
7.1	We generally support the contents of the draft FRMP and the objectives that are set out. We are keen to continue to work closely with you as the objectives in the plan are delivered and work in partnership where appropriate.	Agreed: No response required.
7.2	We are pleased that the FRMPs acknowledge the need to protect key infrastructure. As a statutory water and sewerage undertaker, we are very mindful that our customers – domestic and commercial – are reliant on the essential water and sewerage services that our sector provides.	Noted: No response required.
7.3	Article 7 of the Floods Directive requires that flood risk management plans take the Water Framework Directive's (WFD) environmental objectives into account and requires co-ordination in the application of the two directives. We are pleased to see that the objectives in your FRMP have clear links to those of WFD.	Agreed: No response required.
7.4	From Dŵr Cymru's perspective, it would be an inefficient use of our customer's money if we reduced our impact on particular waterbodies while other pressures, such as inappropriate flood defences, continued to prevent those waterbodies from reaching the good status that the WFD requires.	Noted: No response required.
7.5	We are pleased to note the inclusion of information on how you maintain your assets, particularly culverts and the highway network. It would be useful if we could receive information on your assets as part of the data sharing responsibilities in order for us to better understand the interaction between all drainage infrastructures in the county.	Agree: However, in accordance with the Flood Risk Regulations 2009, any data sharing protocols would need to be reciprocal
7.6	We are keen to continue to develop the good working relationship we have and work with you to keep customers informed of responsibilities for flood risk in the county and also when responding to flood incidents.	Agree: No response required.

Consultee:		Online Questionnaire
Date comments made:		25 th August 2015
Comment Number	Comment Made	Caerphilly County Borough Council Response
Q) Do you agree or disagree that the Draft Flood Risk Management Plan sets out the most significant flood risk in Caerphilly County Borough?		
8.1	With respect to Nelson you have not taken into account the Review of the CCBC's Local Dev Plan, which is to increase housing, which will affect the situation for the residents of Nelson, unless there is major investment into the Nelson Main sewer capacity.	<p>Measures have been included in the Flood Risk Management Plan to deal with Sustainable and Strategic Development Planning issues.</p> <p>In accordance with the Flood Risk Regulations 2009, the Caerphilly County Borough Council Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Therefore flooding from main sewers has not been considered as part of this plan. Dŵr Cymru Welsh Water is the responsible authority for main sewers that cause flooding within the County Borough Council area. However in our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)</p>
8.2	The risk plan over complicates water runoff plans, many local people know which drains and culverts are blocked and waterways diverted.	<p>Caerphilly County Borough Council acknowledges the importance of local community engagement with regards to flood risk. Therefore, measures have been included in the Flood Risk Management Plan to encourage engagement with communities so we can better understand local flooding issues causes and impacts.</p>

Comment Number	Comment Made	Caerphilly County Borough Council Response
8.3	The draft management plan fails to acknowledge the lack of modern sewerage infrastructure upgrade by the appropriate water authority is having a detrimental effect upon residential amenity of older homes whose rainwater run-off, goes into a combined sewer and, there appears to be no plan within the Draft plan to address this problem.	Noted: In accordance with the Flood Risk Regulations 2009, the Caerphilly County Borough Council Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Therefore issues concerning sewer infrastructure have not been considered as part of this plan. Dŵr Cymru Welsh Water is the responsible authority for sewers within the County Borough Council area. However in our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)
8.4	Far too detailed, is it all manageable? I don't think so! Apply Pareto Principles and tackle the 20% that causes 80% of the problem.	Noted: The Flood Risk Regulations 2009 state that 'A lead local flood authority must prepare a flood risk management plan in relation to each relevant flood risk area. ' Therefore to in order to satisfy the regulations, the Caerphilly County Borough Council Flood Risk Management Plan details objectives and measures for all areas where significant flood risk has been identified. Some measures have already been implemented through funding made available by Welsh Government, but in order for this Flood Risk Management Plan to be successful it is essential that significant further funding be made available to Caerphilly County Borough Council from Welsh Government. Failure to receive funding could result in measures identified in this report not being implemented either in part or in full.
Q) What do you consider to be the greatest cause of flood risk in Caerphilly County Borough?		
8.5	It depends on the area. Different problems in different areas.	Agreed: No response required.

Comment Number	Comment Made	Caerphilly County Borough Council Response
Q) What do you consider to be the highest priority for managing flood risk in Caerphilly County Borough?		
8.6	<p>Nelson Main Sewer was built over a hundred years ago. Since then number of people living in the area increased significantly but, there has been little improvement in the capacity of the Nelson main sewer.</p> <p>As before. Depends on the area</p>	<p>Noted: In accordance with the Flood Risk Regulations 2009, the Caerphilly County Borough Council Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Therefore flooding from main sewers has not been considered as part of this plan. Dŵr Cymru Welsh Water is the responsible authority for main sewers that cause flooding within the County Borough Council area. However in our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)</p> <p>Agreed: No response required</p>
Q) Do you agree or disagree that this draft Flood Risk Management plan effectively targets and aims to achieve the objectives set out by Welsh Government National Flood and Coastal Erosion Risk Management Strategy (FCERM).		
8.7	There is lack of financial investment to address the issues.	<p>Agreed: Some measures have already been implemented through funding made available by Welsh Government, but in order for this Flood Risk Management Plan to be successful it is essential that significant further funding be made available to Caerphilly County Borough Council from Welsh Government. Failure to receive funding could result in measures identified in this report not being implemented either in part or in full.</p>
8.8	Lack of consultation.	<p>Strongly Disagree: Caerphilly County Borough Council acknowledges the importance of public engagement. Therefore, it has undertaken three extensive public consultations throughout the process of creating the Local Flood Risk Management Strategy and the Flood Risk Management Plan seeking the public's views regarding flooding issues.</p>

Comment Number	Comment Made	Caerphilly County Borough Council Response
8.9	With the number of new houses the Welsh Government wants to build it needs to be more proactive in making the water authorities provide the infrastructure required. It cannot all be left to developers.	Noted: In our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)
8.10	It's a document to satisfy a request. It is NOT implementable. Far too detailed. The simplest things have not even been done. A 500 page document does nothing unless action follows. Will it? No! You will say there is no money to implement it yet you found money to write it!	Disagree: Some measures have already being implemented from the Local Flood Risk Management Strategy and Flood Risk Management Plan. Ring fenced funding has been received from Welsh Government for the financial years April 2010 to March 2015 to produce statutory documents. This funding has been used to prepare the Preliminary Flood Risk Assessment, Flood Hazard and Flood Risk Maps, the Local Flood Risk Management Strategy and the Flood Risk Management Plan. However, in order for the Flood Risk Management Plan to be successful it is essential that significant further funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.

Comment Number	Comment Made	Caerphilly County Borough Council Response
Q) Do you agree or disagree that the measures contained within the Draft Risk Management Plan satisfactorily address these categories?		
8.11	Not sufficient finance provided to achieve best outcomes for the people affected	<p>Some measures have already being implemented from the Local Flood Risk Management Strategy and Flood Risk Management Plan.</p> <p>However, in order for the Flood Risk Management Plan to be successful it is essential that significant further funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.</p> <p>Noted:</p>
8.12	There are no specific detailed plans within the Draft Plan to assist water companies to increase the capacity of their combined sewers. They will need financial help to do this.	<p>Caerphilly County Borough Council Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Therefore flooding from combined sewers has not been considered as part of this plan. Dŵr Cymru Welsh Water is the responsible authority for combined sewers that cause flooding within the County Borough Council area. However in our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)</p> <p>Noted:</p>

Comment Number	Comment Made	Caerphilly County Borough Council Response
8.13	As before – too complicated – NOT IMPLEMENTABLE.	<p>Some measures have already being implemented from the Local Flood Risk Management Strategy and Flood Risk Management Plan.</p> <p>Ring fenced funding has been received from Welsh Government for the financial years April 2010 to March 2015 to produce statutory documents. This funding has been used to prepare the Preliminary Flood Risk Assessment, Flood Hazard and Flood Risk Maps, the Local Flood Risk Management Strategy and the Flood Risk Management Plan.</p> <p>Disagree: However, in order for the Flood Risk Management Plan to be successful it is essential that significant further funding be made available to Caerphilly County Borough Council on top of the normal funding arrangements from Welsh Government. Failure to receive this additional funding could result in measures identified in this report not being implemented either in part or in full.</p>
Q) How do you think you, as an individual/organisation can support the work set out in the Draft Flood Risk Management plan to reduce flood risk?		
8.14	Getting involved in any consultation.	Agreed: No response required.
8.15	Reporting of issues when known.	Agreed: No response required.

Comment Number	Comment Made	Caerphilly County Borough Council Response
8.16	WG needs to more proactive in putting information about flooding and sewerage capacity of the drainage and sewer systems into the public domain. WG should ask each of the 735 Town and Community Council across Wales to respond to this consultation and it should be more widely known about by the general public, particularly young people should be actively involved.	<p>As part of the Flood Risk Management Plan consultation process, all 18 Town and Community Councils within Caerphilly County Borough Council area have been consulted.</p> <p>Engagement with members of the public was also made via the Council website; social media; various local press releases and the local libraries.</p> <p>Noted: Caerphilly County Borough Council acknowledges the importance of local community engagement with regards to flood risk. Therefore, measures have been included in the Flood Risk Management Plan to encourage engagement with communities so we can better understand local flooding issues causes and impacts.</p>
8.17	Informing the local council of blockages in watercourses, drains, etc, in found in our normal travels, also a Floodline phone number to report a blockage could be advantage.	<p>Agreed: Caerphilly County Borough Council has in place a Highways Customer Care telephone line (01495 235323) for reporting blockages or highway issues.</p>
8.18	Providing feedback to relevant department during flood incidents and undertake monitoring of local environment. Active participation in planning application processes.	<p>Agreed: Caerphilly County Borough Council has the systems in place for reporting flooding incidents; monitoring the environment and providing comments on planning applications.</p>

Comment Number	Comment Made	Caerphilly County Borough Council Response
8.19	By making known to the county Borough the inadequacy of combined main sewers. To make the Authority aware that in heavy rain these sewers overflow onto roads and into people's homes and gardens. The authority must recognise that, the water table too is often high at the bottom of the valleys throughout the Borough. To expect developers to rely on soakaways in new properties and to foot the bill for the necessary sewerage infrastructure needed will not be enough. More and more the Authority is allowing new housing developments.	<p>Measures have been included in the Flood Risk Management Plan to deal with Sustainable and Strategic Development Planning issues.</p> <p>In accordance with the Flood Risk Regulations 2009, the Caerphilly County Borough Council Flood Risk Management Plan covers flooding from surface water, groundwater, ordinary watercourses and the interface with main river flooding. Therefore flooding from combined sewers has not been considered as part of this plan. Dŵr Cymru Welsh Water is the responsible authority for combined sewers that cause flooding within the County Borough Council area. However in our role as a Lead Local Flood Authority we will continue to meet with Dŵr Cymru Welsh Water to discuss and collaborate on all relevant issues. (Please see item 7.2 and 7.6 of this schedule.)</p>
8.20	By being proactive as possible in developing understanding and sharing awareness. By warning of potential flooding incidents and raising the alarm to actual flood events. By actively participating in Highway Team's response to flooding events.	<p>Caerphilly County Borough Council has the systems in place for reporting flooding incidents; monitoring the environment and providing comments on planning applications.</p> <p>Caerphilly County Borough Council acknowledges the importance of local community engagement with regards to flood risk. Therefore, measures have been included in the Flood Risk Management Plan to encourage engagement with communities so we can better understand local flooding issues causes and impacts.</p>
8.21	I regularly report problems. NOTHING gets done!	<p>Caerphilly County Borough Council has in place an excellent customer care system for receiving; logging and monitoring progress of reports of flooding incidents.</p>
8.22	Continue to oppose opens spaces being covered in tarmac, concrete and housing.	<p>Measures have been included in the Flood Risk Management Plan to deal with Sustainable and Strategic Development Planning issues.</p>

Consultee:

Caerphilly County Borough Council (Emergency Planning)

Date comments made:

3rd August 2015

Comment Number	Comment Made	Caerphilly County Borough Council Response
9.1	The Caerphilly County Borough Council Flood Risk Management Plan is a wide ranging and a well set out document, which clearly satisfies the Councils High Level Objective in relation to flood risk within the County Borough Council area. The Plan comprehensively outlines the Council's objectives and measures for the management of flood risk in the identified areas.	Noted No response required
9.2	Incorrect title on Figure 09 – Should read 'Risk to Natural and Historic Environment'	Agreed: Map title to altered on page 62



A greener place
Man gwyrddach

