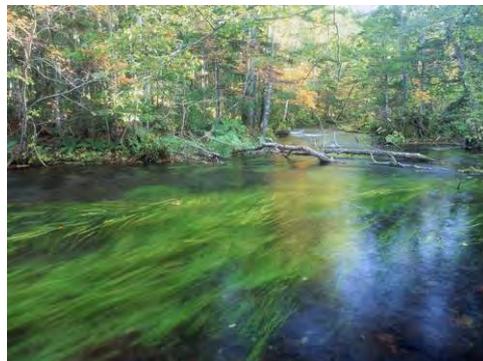


Blaenau Gwent County Borough Council Stage 1 Strategic Flood Consequence Assessment

D129363 - Final
June 2010



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01	June 2010	D129363 Draft – for comment	Gemma Hoad Assistant Water Scientist Patrick Goodey Flood Risk Consultant	Dr Rob Sweet Senior Flood Risk Specialist	Peter Mansell Associate
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Scott Wilson
The Crescent Centre
Temple Back
Bristol
BS1 6EZ

Tel. 0117 917 1230
Fax. 0117 930 0342

www.scottwilson.com

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Executive Summary

This Stage 1 Strategic Flood Consequence Assessment (SFCA) was produced by Scott Wilson for Blaenau Gwent County Borough Council (CBC). This Executive Summary has been produced to enable the wider user to understand the technical content of the Stage 1 SFCA and accompanying appendices.

Strategic Flood Consequence Assessments

This SFCA provides an overview of flood risk from all sources within the Blaenau Gwent CBC administrative area. This provides Blaenau Gwent CBC, developers and other interested parties with general guidance on flood risk and issues associated with flooding. In general flooding has the potential to cause damage and disruption to transport routes, homes, businesses and the environment. This is costly in both social and economic terms and can cause distress, harm and in the worst cases, the loss of life.

The Welsh Assembly Government (WAG) published Technical Advice Note 15 – Development and Flood Risk (TAN15) (WAG, 2004) in 2004, Section 10 of which requires flood risk to be considered within the strategic planning undertaken by Local Planning Authorities (LPAs). This recommends that land allocated for development should be located in areas with the lowest risk of flooding. Only where it can be justified that flood risk is manageable should development be allocated. This approach is referred to as the application of the justification test and is used to test land allocations for development with respect to flood risk.

In order to define the various flood zones and inform the justification test, TAN15 utilises development advice maps (DAMS), whereby flood zones are designated according to the flood risk posed to them, as outlined within Table A below.

Table A: Definition of DAMS and their use within the precautionary framework aspect of TAN15.

Flood Zone	Definition	Use within the precautionary framework
A	Little or no risk of fluvial/ tidal flooding	Justification test is not applied and do not need to consider further
B	Areas known to have flooded historically. Evidenced by sedimentary deposits	Used as part of the precautionary approach to indicate where site levels should be checked against the extreme (0.1% annual probability) flood. No need to consider flood risks further if site levels are greater than the extreme flood level
C	Based on Environment Agency extreme flood outline (0.1% annual probability)	Indicates that flooding issues should be considered as an integral part of the decision making by the application of the justification test, including FCA

Flood Zone	Definition	Use within the precautionary framework
C1	Areas of the floodplain which are developed and served by significant infrastructure, including flood defences	Indicates that development can take place subject to the application of the justification test, including acceptability of consequences
C2	Areas of the floodplain without significant flood defence infrastructure	Indicates that only 'less vulnerable' development should be considered, subject to the application of the justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

In addition to the DAMS, LPAs utilise the Environment Agency Flood Maps to define areas at potential risk and further define the potential flood risks posed to a proposed development. Table B below summarises the Environment Agency Flood Maps

Table B: Return Period and Probability of Fluvial Flooding for Flood Zones 2 and 3

	Flood Zone 2		Flood Zone 3	
	Return Period	Annual Probability	Return Period	Annual Probability
Fluvial	1 in 1000 year	0.1%	1 in 100 year	1%

This Stage 1 SFCA comprises a technical report that has been written to meet the criteria of TAN15. In order to apply the justification test this report provides an assessment of the probability associated with flooding from different flood sources within Blaenau Gwent. The flood sources present within the study area are:

- Fluvial (River flooding occurs when the amount of water in them exceeds the flow capacity of the river channel);
- Groundwater (Groundwater flooding occurs when water in the ground rises above surface elevations);
- Overland Flow (Overland flow flooding occurs when intense rainfall is unable to soak into the ground and runs quickly off the land);
- Sewers (Sewer flooding occurs when the sewer overwhelmed by heavy rainfall, becomes blocked or is of inadequate capacity);
- Artificial Sources (Artificial flood sources include canals, ponds and reservoirs. Flooding may occur in the event of structural failure or breach of retaining wall).

In order to achieve the global aim of the SFCA, the main objectives of this Stage 1 SFCA are:

- Identify and assess the sources of flooding on a strategic scale from all forms of flooding, including fluvial, groundwater, drainage, overland flow and from artificial sources.

- Identify existing flood management procedures already in place, e.g. flood defences and flood warning; and
- Assess the merit of potential increases in surface water runoff arising from new development, including potential application of sustainable drainage systems (SuDS).

Blaenau Gwent CBC are currently in the process of identifying candidate development sites of potential importance. Therefore, on completion of the Stage 1 SFCA, more detailed assessment of any potential strategic candidate sites that are deemed to be at risk of flooding will be assessed via a Stage 2 SFCA.

The Blaenau Gwent Study Area

The study area is defined by the area administered by Blaenau Gwent CBC LPA. The study area (shown in Figure 1 of Appendix A) covers an area of approximately 109km² and is predominantly rural with a number of larger urban areas, including:

- Tredegar Area;
- Ebbw Vale Area;
- Upper Ebbw Fach (Brynmawr, Nantyglo and Blaina); and
- Lower Ebbw Fach (Abertillery).

These urban areas along with the smaller villages dispersed throughout the study area are predominantly at risk from fluvial flooding.

- Within the study area there are a number of watercourses, which drain into two main river catchments, namely:
 - The River Ebbw – This catchment drains land to the east of the study area, and consists of the Ebbw Fawr and Ebbw Fach, which converge in the south of the study area.
 - River Sirhowy - This catchment predominantly drains land in the west of the County. This is a major tributary of the River Ebbw (the two rivers converge downstream of the study area).

The main rivers and catchments are illustrated in Figure 2 in Appendix A of this report.

The risk of flooding in some areas is, to an extent, reduced through the protection provided by either natural or man-made defences. Flooding from overland flow, generated from rainfall running off from the surrounding land, together with flooding from sewers has also been experienced within the study area. The risks of flooding from these sources are forecast to increase with the predicted effects of climate change.

There are limited recorded incidents of groundwater flood within the study area, although groundwater contained within the underlying geology plays an important role in the watercourses flow regimes.

Information Sources

Data for the production of this report was collected from the Environment Agency, Blaenau Gwent CBC, Welsh Water, South Wales Fire and Rescue and Network Rail, and is the best available data at the time of writing. This Stage 1 SFCA is a 'live' document and should be updated on a regular basis as new information becomes available.

Prior to a decision being made about the suitability of a site for development in terms of flood risk, additional data will be required from the developer in the form of a site specific Flood Consequence Assessment.

Deliverables

The main deliverables from this study are the production of this report and a collection of Geographic Information System (GIS) layers that provide mapping of flooding related data across the study area. The GIS mapping provides a tool for planning and development control officers to identify areas where flood risk may be an issue. This will assist the LPA to make consistent and sustainable planning decisions with respect to flood risk. In addition, the GIS framework allows information to be readily updated when new data becomes available.

The GIS layers that have been produced provide mapping of the main rivers and catchments, existing flood risk, locations of historic flooding from all sources (with description), location of flood defences and flood warning areas.

The maps of existing flood risk (i.e. DAMS and Environment Agency Flood Maps) illustrate those areas at risk of flooding during the 1 in 100 year (1% probability) and 1 in 1000 year (0.1% probability) flood event assuming that defences are not present. These are largely based on information provided by the Environment Agency.

The locations of historic and potential flood sources are indicated as GIS layers and provided in Appendix A of this report. The GIS provides information on the date, source and more detail on the location of flooding. This historic flooding information has been sourced from the Environment Agency, Welsh Water's DG5 Register, South Wales Fire and Rescue and from liaison with Blaenau Gwent CBC. The various symbols indicate that flooding occurred in the general area and not necessarily the precise location/extent of the flooding.

The SFCA has identified existing flood defences that are maintained by the Environment Agency or Blaenau Gwent CBC. These defences are either natural or man made. Flooding may occur behind these defences depending on the magnitude of an event.

An understanding of the potential effects of climate change on rainfall and river flows within the study area are required to account for climate change during the strategic land use planning process. In the absence of detailed hydraulic modelling the current Flood Zone 2 extent has been used to demonstrate the extent of the design event (1 in 100 year with climate change) for fluvial flooding.

From the available data, the effects of climate change on groundwater, overland flow and sewer flood sources within the study area have not been possible to assess. The effects of climate change on these flood sources should be investigated through a site specific FCA.

Candidate Site Screening

Using the available data sets and other information gathered or discussed with key stakeholders, the potential candidate sites were screened for inclusion in the Stage 2 SFCA. The screening process used the following key criteria to decide if the sites should be included within the Stage 2 SFCA:

1. Site located within a DAM flood zone;
2. Site located within an Environment Agency Flood Zone;
3. Significant portion of the site located within an ASTSWF area;
4. Locally derived data suggests flooding issues at the site.

The results of this screening process are provided in Table i, below.

Summary

The following points provide a summary of the Stage 1 SFCA report:

- Blaenau Gwent CBC required a Stage 1 SFCA for the progression of its Local Development Plan, to assist development control and to inform emergency planning;
- This report provides the findings of the Stage 1 SFCA;
- Blaenau Gwent CBC will use the findings of this Stage 1 SFCA to undertake the justification test and to inform the Sustainability Appraisal as part of the Local Development Plan;
- Initial assessment of flood sources within the Blaenau Gwent indicates that flooding is mainly fluvial. However, to a lesser extent a flood risk from overland flow exists within the study area, and flood risk from groundwater is considered minimal. There are localised sewer flooding issues within the study area due to limited sewer capacity, however, this is not a significant issue for the County;
- The available data collected for this Stage 1 SFCA has been used to identify which of the potential candidate development sites will require further assessment as part of the Stage 2 SFCA;
- In order to define the strategic candidate sites that will be included in the Stage 2 SFCA, selection criteria were used based on the presence of the site within DAM zone C or B, location within the Environment Agency Flood Zone 2 or 3, location within an ASTSWF or local evidence obtained during the Stage 1 SFCA.

Recommendations

The following points provide the Stage 1 SFCA recommendations:

- The Stage 2 SFCA would involve undertaking a more detailed assessment of the proposed strategic candidate sites, to establish whether the consequences of flooding can be managed in an acceptable way, as required by TAN15;
- The SFCA should be regularly (i.e. annually) updated to include an update of the data sets obtained (e.g. Environment Agency flood maps, DAMs and historical records).

Table i: Screening of candidate development sites for inclusion within the Stage 2 SFCA

Town/ Settlement	Description	Candidate Site Reference Number	Approx. Area (ha)	Area within flood zone (% of site)			Area within Environment Agency Flood Zone (% of site)				Area Within ASTSW (% of site)	Historical Evidence of Flooding	Inclusion in Stage 2 SFCA?		
				A	B	C	1	2	3	Less				Inter	More
Ebbw Vale	Ebbw Vale North	MU1	48.70	99	0	1	99	0	1	15	5	1	DCWW and SWF&R within 400m	Yes	
	Wau-n-y-Pound	B31	6.3	100	0	0	100	0	0	11.0	9.0	2.0	None	Yes	
	Marine Colliery	B34	5.29	1.5	98.5	0	1.5	98.5	0	21.6	25.1	18.1	None	Yes	
Tredegar	Cartref Aneurin Bevan	A25	0.38	100	0	0	100	0	0	82.0	13.0	0.0	DCWW and SWF&R – within 100m	Yes	
	Greenacres	A26	0.5	100	0	0	100	0	0	11.7	24.2	21.9	DCWW within 300m, SWF&R – within 200m	Yes	
	Jesmondene Stadium, Cefn Golau	A45	5.26	100	0	0	100	0	0	0.2	0	0	DCWW and SWF&R but downslope of site	No	
Abertilly	Business Resource Centre, Tafarnaubach	A43	1.20	100	0	0	100	0	0	17.5	9.5	0.0	DCWW over 400m from site, across Head of the Valleys Road	No	
	Tredegar Workshops	A14	3.05	77.4	19.1	3.5	77.4	19.1	3.5	6.6	28.9	44.7	EA, DCWW and SWF&R within 400m	Yes	
	Tesco, Castle Street	D31	2.92	26.7	37.1	36.2	26.7	37.1	36.2	7.9	20.8	28.1	EA and DCWW within 100m	Yes	
Upper Ebbw Fach	Land to the North of Winchestown, Nantyglo	C12	0.42	100	0	0	100	0	0	0	0	0	DCWW and SWF&R but 400m away and downslope	No	
	NMC Factory and Bus Depot	MU3	2.95	100	0	0	100	0	0	33	14	0	None	No	

			Area within DAM flood zone (% of site)	Area within Environment Agency Flood Zone (% of site)	Area Within ASTSFW (% of site)								
North Rising Sun Industrial Estate	C19	3.12	95.5	0	4.5	0	0	0	EA, DCWW and SWF&R within 300m	Yes			
Adjacent to Blaen-y-Cwm School	C28	1.42	100	0	100	0	0	0	DCWW and SWF&R but over 400m from site	No			
Lower Plateau Six Bells Colliery Site	D11	1.05	4.4	10.4	85.2	4.4	10.4	85.2	7.4	28.0	56.4	EA, DCWW and SWF&R within 300m	Yes
Roseheyworth Business Park	D22	2.56	65.5	34.5	0	65.5	34.5	0	39.0	5.7	0.0	None	Yes

1 Introduction

1.1 Background

- 1.1.1 The Planning and Compulsory Purchase Act 2004 (PCPA) (HMSO, 2004) requires Local Planning Authorities (LPAs) to produce Local Development Plans (LDPs) that will replace the system of Local, Structure and Unitary Development Plans. The PCPA 2004 requires all LDPs to undergo a Sustainability Appraisal (SA), which assists LPAs in ensuring that their policies fulfil the principles of sustainability. Strategic Flood Consequence Assessments (SFCAs) should be used to inform the SA and LDP process and to ensure proposed developments are steered towards the lowest possible flood risk zone.
- 1.1.2 Planning Policy Wales (PPW) administers the production of Technical Advice Notes (TAN), of which TAN15: Development and Flood Risk provides guidance in relation to flooding. LPAs should take into account the guidance provided in TAN15 when preparing their LDPs and when assessing individual planning applications.

Fundamentals of TAN15

- 1.1.3 TAN15 utilises Development Advice Maps (DAMS) to identify where and when flood risk issues should be taken into account within the development planning process. The DAMS take account of fluvial flooding within Blaenau Gwent and are shown in Figure 3 of Appendix A.
- 1.1.4 In order to define the various flood zones and inform the justification test, TAN15 utilises development advice maps (DAMS), whereby flood zones are designated according to the flood risk posed to them, as outlined within Table 1 below.

Table 1: Flood Zone designations, their associated flood risk definition and use within the precautionary framework (TAN15, 2004).

Flood Zone	Definition	Use within the precautionary framework
A	Little or no risk of fluvial/ tidal flooding	Justification test is not applied and do not need to consider further
B	Areas known to have flooded historically. Evidenced by sedimentary deposits	Used as part of the precautionary approach to indicate where site levels should be checked against the extreme (0.1% annual probability) flood. No need to consider flood risks further if site levels are greater than the extreme flood level
C	Based on Environment Agency extreme flood outline (0.1% annual probability)	Indicates that flooding issues should be considered as an integral part of the decision making by the application of the justification test, including FCA
C1	Areas of zone C which are developed and served by significant infrastructure, including flood defences	Indicates that development can take place subject to the application of the justification test, including acceptability of consequences
C2	Areas of zone C without significant flood defence infrastructure	Indicates that only 'less vulnerable' development should be considered, subject to the application of the justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

- 1.1.5 In addition to the DAMS, the Environment Agency identifies areas at potential risk of inundation during various magnitude flood events, via their Flood Zone maps. The definitions of these Flood Maps are provided in Table 2 below. The Environment Agency Flood Map for the entire Blaenau Gwent area is shown in Figure 4 in Appendix A.

Table 2: Environment Agency Flood Zone definitions

Flood Zone	Definition
Flood Zone 1	Low probability - Defined as zone where there is a less than 0.1% (1 in 1000 year) probability of flooding each year.
Flood Zone 2	Medium probability - Defined as having between 0.1% and 1% (between 1 in 1000 and 1 in 100 year) probability of fluvial flooding each year and between 0.1% and 0.5% (between 1 in 1000 and 1 in 200 year) probability of tidal flooding each year.
Flood Zone 3	High probability - Defined for as having a 1% or greater (1 in 100 year or greater) probability of fluvial flooding each year and a 0.5% or greater (1 in 200 year or greater) probability of tidal flooding each year.

- 1.1.6 During the planning process, the Environment Agency provides advice to the LPA on flooding issues. TAN15 suggests that development (excluding Emergency Services) should be designed to be flood free during the 1% annual probability fluvial flood event and 0.5% annual probability tidal event, inclusive of the potential impacts of climate change. As a result there is a threshold frequency outlining the minimum standard of protection required by a proposed development site. The threshold frequency for various development types is provided in Appendix B. This table is provided in TAN15 and should be used as indicative guidance only.
- 1.1.7 In conclusion, TAN15 utilises the DAMS to identify where the consequences of flooding should be considered within the development planning process. Once identified, liaison and advice from the Environment Agency is typically utilised to further assess and refine development plans to ensure flood risks and consequences are managed effectively. Appendix B of this report provides additional information relating to TAN15 and the assessment of flood consequences.

1.2 Definition of a SFCA

- 1.2.1 TAN15 does not contain specific guidelines regarding the application of SFCAs. However, the Environment Agency has produced a guidance document in the form of an Operating Instruction on SFCAs. This document outlines that the primary aim of an SFCA is to aid the LPA to make informed decisions when considering future development within their area. This will enable wherever possible, that development would be directed towards areas at lower risk of flooding.
- 1.2.2 SFCAs are typically completed in three stages, Stage 1, Stage 2 and Stage 3 as defined below.

Stage 1 SFCA

- 1.2.3 Stage 1 SFCAs are typically desk-based studies utilising information and data collated from a number of stakeholders such as the Environment Agency, LPA and water utility companies, amongst others. The collection of such data allows the study to undertake a broad assessment of potential flood risks across the entire study area. The desk study identifies areas at potential high risk from flooding as well as providing details of historical flood events within the study area. The

Stage 1 SFCA should also provide details of any flood risk management structures or procedures present.

1.2.4 To assist LPAs in their strategic land use planning, a Stage 1 SFCA should present sufficient evidence to apply the sequential approach aspect of TAN15 to their proposed development sites. The sequential approach aims to steer development towards the lowest reasonably available flood risk zone.

1.2.5 In addition a Stage 1 SFCA should identify and assess the following:

- All potential sources on a strategic scale;
- Existing flood risk management infrastructure;
- Potential increase in flood risk arising as a result of proposed development; and
- Physical features that could breach or convey flood flow to other areas not considered to be directly at risk from the source.

Stage 2 SFCA

1.2.6 Stage 2 SFCAs principally involve a continuation of the application of the justification test aspect of TAN15. It is unlikely that the potential candidate sites within the Stage 1 SFCA would be at the same flood risk. Therefore, sites deemed to have a potential greater risk of flooding may require some further study to gain a better understanding of the risk posed and provide potential options to manage or mitigate the risk.

Stage 3 SFCA

1.2.7 A Stage 3 SFCA would be required if a Stage 1 or 2 SFCA were unable to satisfy the requirements of TAN15 for a potential development site due to a lack of available data regarding flooding consequences at a site. A Stage 3 SFCA typically requires more detailed analysis of flooding mechanisms and consequences, and as such typically requires some hydraulic computer modelling or hydrological analysis.

1.3 Aim and Objectives

1.3.1 The overall aim of this Stage 1 SFCA is to aid the LPA in the justification test aspect of TAN15 and to sequentially locate their development taking the consequences of flooding into consideration. In order to achieve this aim, the following objectives will be met:

- Identify and assess the sources of flooding on a strategic scale from all forms of flooding, including fluvial, groundwater, drainage, overland flow and from artificial sources;
- Identify existing flood management procedures already in place, e.g. flood defences and flood warning;
- Assess potential increases in surface water runoff arising from new development, including potential application of sustainable drainage systems (SuDS); and,
- Assess potential flood risks arising from artificial flood sources, e.g. canals or reservoirs.

2 Blaenau Gwent Borough Council Study Area

- 2.1.1 The study area is defined by the administrative boundary of the Blaenau Gwent LPA area. The Blaenau Gwent CBC area borders the administrative area of Caerphilly Council in the south west, Torfaen County Borough Council in the south east, Powys County Council in the north and Monmouthshire Council in the northeast. Blaenau Gwent adjoins the Brecon Beacons National Park.
- 2.1.2 Blaenau Gwent covers an area of approximately 109km² with a population of 68,400. The main urban settlements within Blaenau Gwent are Tredegar Area, Ebbw Vale Area, Upper Ebbw Fach (Brynmawr, Nantyglo and Blaina) and Lower Ebbw Fach (Abertillery).

2.2 Hydrological Climate

- 2.2.1 As with much of the valleys areas of south Wales, Blaenau Gwent has a relatively high amount of rainfall, when compared to the rest of the UK. The average annual rainfall for the entire area is approximately 1,600mm. Rainfall values were obtained from the Flood Estimation Handbook (FEH) CD-ROM (Marshall and Bayliss, 1999).
- 2.2.2 Rainfall in Blaenau Gwent predominantly falls as relatively low intensity, long duration rainfall that is dominated by frontal weather systems¹. However, short duration, high rainfall intensity storms are also experienced due to the upland nature of the study area.

2.3 Local Watercourses and Catchment Areas

- 2.3.1 Blaenau Gwent lies within the catchments for two watercourses, the River Sirhowy and the River Ebbw.
- 2.3.2 Several tributaries of the Sirhowy and the Ebbw, along with their associated sub-catchments are present within Blaenau Gwent. Such tributaries include the Tillery. These watercourses and the various smaller, sub-catchments are shown in Figure 2 in Appendix A.

Ebbw River

- 2.3.3 The Ebbw catchment is approximately 263km² and consists of three major rivers, the Ebbw Fawr, Ebbw Fach and Sirhowy. The Ebbw Fawr rises in the Brecon Beacons, to the northwest of Carno Reservoir. It flows south through the town of Ebbw Vale, where it converges with the Ebbw Fach at Aberbeeg. The Ebbw Fach itself rises near Nantyglo where it is sourced from a number of local drains and watercourses. It then flows south through Abertillery, before turning southwest and converging with the Ebbw Fach at Aberbeeg. Downstream of the convergence of the Ebbw Fach and Ebbw Fawr, the watercourse becomes the Ebbw River. The Ebbw River flows through the southwest area of Blaenau Gwent (forming the southwestern boundary of the council area), where it continues to flow south, before discharging into the River Usk as it joins the Severn Estuary at Newport.

¹ This observation is supported by the Flood Studies Report that provides a rainfall ratio value of between 15 and 20 (which indicates the difference in rainfall depth between the 60-minute duration storm and 2-day duration storm).

River Sirhowy

- 2.3.4 The Sirhowy catchment is approximately 76km² and rises to the west of Shon Sheffrys' Reservoir in Trefil in the north-west of Blaenau Gwent. It flows south through Tredegar and down the Sirhowy Valley before converging with the Ebbw River near Crosskeys. Although the River Sirhowy is a major tributary of the Ebbw River their confluence is located within the administrative area of Caerphilly.
- 2.3.5 The three principal watercourses (Ebbw Fach, Ebbw Fawr and Sirhowy) are all located within the Ebbw River catchment. However, for the purposes of this study, each of the three watercourses is considered to be a separate sub-catchment.

2.4 Topography

- 2.4.1 The topography of the land can affect the hydrological regime of an area and dictate how the catchment responds to rainfall. Typically, watercourses in lower lying, flatter areas respond gradually to rainfall and in times of flood can have long duration events. Watercourses in steeper upland areas can respond quickly to rainfall but the flood events themselves have a shorter duration.
- 2.4.2 The topography of Blaenau Gwent is fairly typical of the South Wales valleys in that it is dominated by relatively steep sided valleys. However, the areas in the north of the study area have a gentler topography as they are located within the foothills of the Brecon Beacons.
- 2.4.3 The topography of both the Ebbw and Sirhowy Rivers is characterised by narrow river channels bounded by steep sided valleys, with limited floodplains.

2.5 Geology and Soils

Geology

- 2.5.1 The geology of Blaenau Gwent is relatively uniform with the bedrock of the area dominated by the South Wales Coal Measures, made of the Westphalian Series, which are typically coal-bearing mudstones and sandstones. This geology can be relatively permeable in places, meaning that water can permeate the surface and enter watercourses via underground (through flow), rather than overland methods.
- 2.5.2 The far northern extent of the study area (in the vicinity of the Brecon Beacons, to the north of Tredegar), the bedrock consists of limestones (Carboniferous Limestone) and Millstone Grits (Namurian Millstone). These layers typically have high permeability, particularly where limestones have been fractured or weathered.
- 2.5.3 With regard to superficial deposits, much of the upper topographic areas are dominated by the bedrock with little or no superficial deposits. The exception to this is the areas around Tredegar and Ebbw Vale, which have some Alluvium and Glacial Till present. The areas at the base of the river valleys contain superficial deposits typical of such features, for example alluvial and river terrace deposits. Outcrops of peat are located in the northern extent of the study area, to the north of Tredegar and Ebbw Vale.

Soils

- 2.5.4 The soils of the upper topographical areas are typified by loams overlying the Coal Measures, which generally have relatively high infiltration rates. Soils in the lower topographical areas of the valleys are typically loamy, sandy soils associated with alluvial deposits and have variable permeability. In the northern extent of the study area (north of Tredegar and Ebbw Vale), surface water gleys and organic soils are found. These soils are typified by seasonal waterlogging and are associated with the peat drift geological deposits explained above.
- 2.5.5 It is believed that there are also some man-made soil structures, mostly reformed soils from former mining and quarrying activities. Such soils are typically located within the vicinity of Tredegar, Ebbw Vale and Brynmawr and have variable infiltration rates, depending on the nature of the parent soils or geology.

3 Data Collection and Review

3.1 Overview

3.1.1 This section provides details of the data collection process undertaken for this Stage 1 SFCA. It describes how this information has been processed and presented in a format to enable Blaenau Gwent CBC to undertake the justification test aspect of TAN15.

3.1.2 The programme of works undertaken in the preparation of this Stage 1 SFCA is as follows:

- Inception meeting with Blaenau Gwent CBC, and the Environment Agency on 20th January 2010;
- Identification of the local stakeholders;
- Issue of letters to stakeholders requesting data/information;
- Followed-up data requests (where required);
- Collation and review of available data;
- Review of received data against the SFCA objectives;
- Identification of gaps in data;
- Provision of options to address gaps in data; and,
- Production of a broad-scale assessment of flood risk.

3.2 Stakeholder Meeting and Consultation

3.2.1 The inception meeting undertaken on the 20th January 2010 was held at Blaenau Gwent Resource Centre with representatives from Scott Wilson, Blaenau Gwent CBC and the Environment Agency. The meeting identified the key stakeholders, confirmation of the data they possess, the format of the SFCA reporting and agreed the programme for undertaking the SFCA.

3.2.2 The following stakeholders were contacted to provide data and information with respect to flood risk, which was used to inform this Stage 1 SFCA:

- Blaenau Gwent CBC;
- Environment Agency;
- Welsh Water Ltd (Dwr Cymru); and
- South Wales Fire and Rescue.

3.2.3 The data provided was either in GIS format or was manipulated from raw data for use as a GIS dataset. Other stakeholders were consulted (South Wales Trunk Road Authority, Network Rail) who either provided data of limited use or were unable to provide data relevant to flood risk.

3.3 Information Received

Blaenau Gwent County Borough Council

Candidate Development Sites

- 3.3.1 As part of the ongoing LDP process, Blaenau Gwent CBC have identified a number of strategic candidate sites that have the potential to meet the strategic development requirements of the County. Table 3 below identifies the candidate sites within Blaenau Gwent. These sites have been used as part of the evidence base of this SFCA and would be subject to the justification test aspect of TAN15. The candidate sites were also provided in GIS format for use within this SFCA.
- 3.3.2 It should be noted that the Blaenau Gwent LDP has included a number of sites that already have planning permission granted or are under construction. It is considered that such sites would have been subject to more detailed FCAs or similar, where required, at the planning application phase that would supersede any Stage 1 or 2 SFCA. Therefore, these sites have been excluded from the list provided in Table 3 below. In addition, Blaenau Gwent CBC have screened two sites out at the candidate site selection phase on account of them being located within an area of significant flood risk.

Table 3: Strategic Candidate Sites within Blaenau Gwent LPA Administrative Area

Town/ Settlement	Description	Candidate Site Reference Number	Approx. Area (ha)
Ebbw Vale	Ebbw Vale North	MU1	48.70
	Waun-y-Pound	B29 – 31	7.5 (total)
	Marine Colliery	B34	5.29
Tredegar	Cartref Aneurin Bevan	A25	0.38
	Greenacres	A26	0.5
	Jesmondene Stadium, Cefn Golau	A45	5.26
	Business Resource Centre, Tafarnaubach	A43	1.20
	Tredegar Business Park	A14	3.05
Abertilly	Tesco, Castle Street	D31	2.92
	Land to the North of Winchestown, Nantyglo	C12	0.42
Upper Ebbw Fach	NMC Factory and Bus Depot	MU3	2.95
	North Rising Sun Industrial Estate	C19	3.12
	Adjacent to Blaen-y-Cwm School	C28	1.42
	Lower Plateau Six Bells Colliery Site	D11	1.05
Lower Ebbw Fach	Roseheyworth Business Park	D22	2.56

Development Advice Maps (DAMS)

- 3.3.3 Blaenau Gwent CBC provided the DAMS for the Blaenau Gwent LPA administrative area. These are shown for the entire Blaenau Gwent area in Figure 3 in Appendix A. The DAMS were provided in GIS format.

Surface Water Flooding

- 3.3.4 Surface water flooding is typically generated by short duration, intense rainfall events where precipitation is unable to infiltrate the ground or enter drainage systems. Subsequently, water may become transferred overland causing localised flooding.
- 3.3.5 Liaison with Blaenau Gwent CBC drainage engineers and emergency planning teams has revealed the various areas considered to be at risk of surface water flooding and provided a map showing the known worst effected areas, which has been provided in Appendix C. Blaenau Gwent CBC also provided maps indicating Areas Susceptible to Surface Water Flooding (ASTSWF) in GIS format (see Section 4.7 for an explanation of these maps)

Further GIS Data

- 3.3.6 In addition to the DAMS, candidate sites and ASTSWF maps, the following data was provided by Blaenau Gwent CBC in GIS format:
- Ordnance Survey 1:10,000 and 1:50,000 maps covering the entire Blaenau Gwent CBC area; and
 - Boundary data showing the Blaenau Gwent LPA administrative boundary.

Environment Agency

Fluvial Flooding

- 3.3.7 Fluvial flooding is most commonly caused by intense rainfall causing flash flooding, or following prolonged rainfall upon saturated ground, resulting in rivers bursting their banks and flooding adjacent areas. Various situations can exacerbate fluvial flood risk, such as culvert or bridge blockage or infrastructure failure.
- 3.3.8 The Environment Agency provided their Flood Maps for the entire study area. The Flood Maps show the extent of Flood Zones 2 and 3 (ignoring the presence of flood defences), as defined in Table 2, for all Main Rivers (i.e. watercourses under the jurisdiction of the Environment Agency).
- 3.3.9 The Flood Maps have been developed by the Environment Agency using a broad-scale model (JFLOW). More detailed hydraulic models use more accurate topographic data and rigorously derived flow estimates to define flood extents. Where hydraulic models exist, these provide greater accuracy in defining flood extents and supersede the JFLOW-derived Flood Maps in these locations. The Environment Agency does not possess any hydraulic models that cover the watercourses in the Blaenau Gwent area.
- 3.3.10 The Environment Agency Flood Maps do not provide information on flood depth or velocity of flow. It also does not cover flooding from other sources, such as groundwater, surface water runoff, or overflowing sewers.
- 3.3.11 The Environment Agency updates Flood Zone Maps on a quarterly basis, incorporating the results of detailed studies where relevant. In addition to the generalised Flood Zone maps, the Environment Agency provided additional, more detailed information on fluvial and historical events.

Historical Flooding Records

- 3.3.12 The Environment Agency has provided a GIS layer showing the known locations of historic flooding across the study area. This information combined with records provided by Blaenau Gwent CBC Highway Drainage, Welsh Water, South Wales Trunk Road Authority, Network Rail and South Wales Fire and Rescue represented the best available data attributed to flooding from fluvial, surface water and groundwater. This information supplemented additional datasets for fluvial, surface water and sewer flooding.

Flood Defences

- 3.3.13 Traditionally, flood defences are often man-made structures, such as walls or embankments, adjacent to the open coast or aligned along the banks of a river system, which are intended to prevent flooding of land that lies behind. More recently, 'softer' approaches have been adopted, such as the allocation of land to flood, in preference of somewhere more vulnerable. Flood defences do not entirely remove flood risk and a residual risk will remain, if for example, an embankment becomes breached or is overtopped.
- 3.3.14 The Environment Agency has provided information obtained from their National Flood and Coastal Defence Database (NFCDD) showing details of structures and flood defence assets within Blaenau Gwent. This provides details of the asset reference, location and standard of protection that the structure or defence provides. The locations of formal defences are shown in Figure 5 of Appendix A.

Surface Water and Overland Flow

- 3.3.15 Historical records and local knowledge of problem surface water areas were provided by the LPA as the primary source of this information with additional data provided by the Environment Agency.

Artificial Sources of Flooding

- 3.3.16 Within Blaenau Gwent the principal artificial sources of flooding include reservoirs and large storage areas. The Environment Agency Reservoirs Safety Team provided the location and details of reservoirs/storage areas within Blaenau Gwent, as shown in Figure 2 of Appendix A. These are provided for storage areas that fall under the Reservoirs Act and therefore contain at least 25,000m³ of water. As part of the recently released Flood and Water Management Act, it is proposed to reduce the reservoir threshold to 10,000m³ and thus potentially increase the number of designated reservoirs in Blaenau Gwent. However, this has not been confirmed at the time of writing.
- 3.3.17 There are eight reservoirs/storage areas situated within Blaenau Gwent that have the potential to present a flood risk due to failure or overtopping, these are shown in Table 4 below:

Table 4: Reservoirs within Blaenau Gwent CBC, data supplied by the Environment Agency Reservoir Safety Team

Reservoir Name	Location (NGR)	Capacity (m ³)	Type
Blaen-y-cwm	SO1730013000	1,204,715	Impounding
Bryn Bach Park Lake	SO1270010100	25,000	Impounding
Cairn Mound	SO2010013600	94,720	Impounding
Carno Lower	SO1650012900	800,000	Impounding

Reservoir Name	Location (NGR)	Capacity (m ³)	Type
Shon Sheffrey	SO1300011600	319,500	Impounding
Tredegar House Lake	ST2880085500	30,500	Impounding
Waun Pond	SO1880011100	100,000	Impounding
Waun-y-Pound Upper (Blue Lake)	SO1518310798	82,739	Impounding

Groundwater

- 3.3.18 Groundwater flooding occurs when water levels in the ground rise above surface elevations and cause spring resurgence. The Environment Agency Eastern Valleys CFMP has been referred to in order to potentially identify areas at risk from groundwater flooding within Gwent CBC.

Topographic Data - LiDAR

- 3.3.19 The Environment Agency has provided Light Detection And Ranging (LiDAR) for the study area. LiDAR is an airborne mapping technique that uses a laser to measure the distance between the aircraft and the ground. It varies in accuracy depending on the nature of the terrain such as in woodlands or complex urban areas. However, LiDAR data is generally recognised to be accurate to within +/- 50 to 150mm when compared to actual vertical levels.

Geographical Data

- 3.3.20 The Environment Agency provided GIS layers showing the location of the Main Rivers (i.e. watercourses within their jurisdiction) within Blaenau Gwent. Also provided in GIS format were the catchment and sub-catchment boundaries for the larger watercourses within the study area.

Welsh Water Ltd. (Dwr Cymru)

- 3.3.21 Sewer systems are typical to all the urban locations within the study area. Modern sewer systems are typically designed to accommodate storm events with a 3.3% annual probability (1 in 30 year return period) and are normally separated into foul and surface water sewers. Older sewer systems were often constructed without consideration of a design standard and may in some areas have an effective design standard of less than 30 years. In addition, these systems were often designed to convey foul and surface water flows in combination. Consequently, storm events with a return period exceeding 30 years would be expected to result in flooding of some parts of the sewer system.
- 3.3.22 The management of storm water/foul water for the study area is the responsibility of Dŵr Cymru Welsh Water Ltd (DCWW) and Blaenau Gwent CBC. In addition, private individuals may be responsible for drainage systems that operate prior to discharge either into a watercourse or into a public sewer.
- 3.3.23 DCWW is the statutory water undertaker and is responsible for the public sewer systems within Blaenau Gwent. DCWW maintains a register of historical sewer flooding events (DG5 Register) at the postcode scale within Blaenau Gwent. Details from this historical register have been provided for incorporation into this Stage 1 SFCA. Most notably Figure 5 in Appendix A. This register also indicates the relevant intensity (i.e. return period) of the storm that produced the recorded events, where known.

South Wales Fire and Rescue Service

- 3.3.24 South Wales Fire and Rescue Service provided records of all flooding incidents since October 2002, records prior to this were unavailable. This dataset provides information relating to where and when the fire service responded to an emergency call relating to a flood incident.
- 3.3.25 Due to the remit of the South Wales Fire and Rescue Service, they are not required to record the cause of the event that required their emergency response. Some records were provided with causes, such as 'Flooding caused by adverse weather' or 'Multiple incidences'. In these cases, and when numerous 'Unknown' incidents occur on the same date and within a small area, e.g. a street or road, it is assumed that these are caused by severe weather and have been identified on a GIS layer for use in this SFCA.

Network Rail

- 3.3.26 Network Rail provided locations of various structures within their jurisdiction, which includes culverts, pipes, drains and watercourses, amongst others. These are deemed to be of limited use as part of this Stage 1 SFCA but may be of some use as part of more detailed investigations within the Stage 2 SFCA. In addition, Network Rail has confirmed that they know of no locations that are known to regularly experience flooding problems.

3.4 Policy Review

- 3.4.1 In order to place flood consequences and risk within the context of national, regional and local policies, a review of relevant policy documents has been undertaken. This review is included within Appendix B of this report.
- 3.4.2 The policy review includes greater detail with regard to TAN15 than is presented throughout the main report. It also provides details of the sequential approach aspect of TAN15 which plays an important role in the development allocation process by steering development into the lowest flood risk zone possible. Where this is not possible, or for wider issues development has to be located within a high risk zone, the justification test provides criteria that should be adhered to in order to justify the location of development within a flood risk area.

4 Flood Risks in Blaenau Gwent

- 4.1.1 This section outlines how the data collected has been disseminated and used in order to assess the flood risks posed on a strategic scale within Blaenau Gwent and how these risks are currently managed.
- 4.1.2 The predominant method of disseminating flood related information (such as Environment Agency Flood Zones and recorded flooding incidents) as part of this SFCA is through the use of GIS using MapInfo v9.5. This allows the storage, interrogation, analysis and presentation of key information in a clear and concise manner, such as the map outputs shown in Appendix A. Therefore, it is important that the various limitations and assumptions associated with such strategic level mapping is understood in order to both sequentially locate development to the lowest flood risk zone possible and to substantially refine site specific Flood Consequence Assessments (FCAs) where required.
- 4.1.3 Data stored within GIS can contain attribute data which provides greater detail to the dataset other than simply a visual representation. Such data has been used to inform this SFCA report.
- 4.1.4 Datasets created and manipulated in GIS have the ability to be updated in line with newly released data meaning they can remain a relevant resource throughout the LDP process.
- 4.1.5 Appendix A includes maps that have been produced for Blaenau Gwent CBC for application of the justification test aspect of TAN15. Figure 3 in Appendix A shows the DAMS for Blaenau Gwent whilst Figure 4 in Appendix A shows the Environment Agency Flood Maps for fluvial flooding.

4.2 Requirements of TAN15

- 4.2.1 Although TAN15 does not contain specific guidance on the requirements of SFCAs, it does provide guidance on the consideration of development plan policy and site allocations, notably Section 10 (in particular 10.4 to 10.8). In addition, its overarching aim is to steer development to the lowest possible flood risk areas. Where this is not possible, development should be justified in order for it to be located within a flood risk zone.
- 4.2.2 The aim of this SFCA is to aid Blaenau Gwent CBC in their strategic placement of development and where necessary provide greater detail sufficient for the sequential approach aspect of TAN15 be undertaken.
- 4.2.3 With regard to surface water runoff, TAN15 requires post development runoff rates to be no greater than the pre-development rates. In addition, developers should utilise SuDS, wherever local conditions allow.
- 4.2.4 Appendix 1 of TAN15 provides greater detail on the assessment of flood consequences at the individual site level.
- 4.2.5 Appendix B of this report provides additional information on how TAN15 informs the assessment of flood consequences in the development process.

4.3 Fluvial Flooding

Fluvial Flood Zone Mapping

- 4.3.1 The Environment Agency provided GIS layers for Flood Zones 2 and 3 throughout Blaenau Gwent, which are shown in Figure 4 in Appendix A.
- 4.3.2 Blaenau Gwent CBC provided Dam maps for the entire study area in GIS format. These are shown in Figure 3 in Appendix A. In order to ensure the emerging LDP and candidate site assessment process is sufficiently sound, an analysis of the DAM maps in relation to candidate sites has been included within the methodology of this SFCA. Section 5.2 provides additional information on the site analysis methodology.

Historical Fluvial Flooding

- 4.3.3 The Environment Agency have provided a GIS layer indicating the locations of historic flood events associated with fluvial and surface water events within the Blaenau Gwent CBC administrative area. The data provided presents recorded incidents during flood events that occurred in the Decembers of 1960 and 1979. The data suggests that the worst effected river was the Ebbw, predominantly the confluence of the Ebbw Fach and Fawr in the vicinity of Glandwr and Aberbeeg.
- 4.3.4 The historical flood data is shown in relation to the various proposed candidate development sites in Figure 6 of Appendix A with additional details provided in Appendix C. In addition, the Eastern Valleys CFMP provides some details of historical flood events relevant to Blaenau Gwent, which are summarised in Appendix C.
- 4.3.5 In addition to the events outlined in Appendix C, flooding was experienced in August and September 2008 across Blaenau Gwent. Heavy rain was experienced (over 38mm of rain fell overnight between the 4th and 5th September²) in the area and although neighbouring catchments (e.g. Rhondda and Cynon valleys) were worse effected, some disruption was experienced in Blaenau Gwent, particularly in Ebbw Vale.

Impact of Climate Change

- 4.3.6 It is predicted that climate change will bring milder wetter winters that are characterised by periods of long duration rainfall. In contrast, frequent and short duration, high-intensity rainfall linked with longer drier summers is predicted. These scenarios are likely to cause increased flooding from fluvial, surface water and sewer sources.
- 4.3.7 In terms of fluvial flooding, guidance within TAN15 along with other Environment Agency and DEFRA guidelines indicate that peak river flows will increase by 20% over the next 50 - 100 years. In the absence of flow data but presence of water level data, the DEFRA report FD2320/TR2, 'Flood Risk Assessment Guidance for New Development' (DEFRA, 2005) can be used to estimate the effects of climate change on flood levels. Section 11 of the DEFRA report outlines that a proposed development should set finished floor levels at 600mm above the 1% annual probability flood levels and include a further 150mm freeboard. The use of this guidance should be superseded by full hydraulic modelling inclusive of the impacts of climate change where possible.

² <http://news.bbc.co.uk/1/hi/wales/7599546.stm>

- 4.3.8 The DAMS and Environment Agency Flood Maps do not include an allowance for climate change. Therefore, in locations where climate change extents are not available, it is recommended that the Environment Agency defined Flood Zone 2 should be treated as Flood Zone 3 inclusive of climate change. This has not been reflected within the Stage 1 mapping but, if after the application of the justification test, development is likely to fall within Flood Zones 2 or 3, the likely effects of climate change should be investigated as part of the Stage 3 SFCA or site specific FCA.

Unmapped Watercourses

- 4.3.9 The Environment Agency Flood Zone mapping covers the majority of watercourses within the study area. However, where catchments are less than 3 km² in area, the Environment Agency mapping does not typically define Flood Zones 2 and 3. Consequently, there are some locations where Flood Zones are not defined. These are generally in areas of higher elevation within the headwaters of small catchments or minor tributaries.
- 4.3.10 It is recommended that a 20m buffer either side of the channel bank top be designated as Flood Zone 3. However, further investigation and refinement of the Flood Zones should be undertaken as part of a site specific FCA or Stage 3 SFCA. This is particularly prevalent in areas of steeper topography where the natural floodplain for a watercourse is likely to be less than for areas with more gently sloping land.

4.4 Existing Fluvial Flood Risk Management

Catchment Flood Management Plan

- 4.4.1 The Eastern Valleys CFMP outlines the Environment Agency's existing flood risk management role within the CFMP area (including the County of Blaenau Gwent). The main roles of the Environment Agency within flood risk management are summarised as follows:
- Flood mapping such as the national level Flood Map showing the 1% annual probability (fluvial), 0.5% annual probability (tidal) and 0.1% annual probability flood outlines;
 - Strategic planning and development control such as ensuring flood risks have been adequately considered and mitigated (where necessary) as part of development control;
 - Flood defence asset management and operations delivery, such as using the NFCDD defence data to hold information and undertake routine maintenance of defences and construct new alleviation schemes;
 - Maintain permissive powers on Main Rivers;
 - Lead role in flood forecasting and incident management; and
 - Raise and maintain a sufficient level of public awareness.
- 4.4.2 The CFMP also outlines the Environment Agency's role in future flood risk management and has undertaken catchment and sub-catchment hydraulic modelling to estimate the impact on flood extents and levels as a result of various future scenarios. These future scenarios have been based on increases attributed to urbanisation, climate change and land use.
- 4.4.3 Using the information from the future hydrological estimation, the CFMP has included a number of objectives to limit the damage and harm to people, property and the environment in the future.

4.4.4 In order to sustainably manage flood risks through the CFMP area, policies have been identified for individual areas within the CFMP boundary, known as Policy Units. Blaenau Gwent falls within two Policy Units, Mid and Upper Reaches and Upper Ebbw. For each Policy Unit, the existing and future risks are identified and quantified (in terms of properties at risk and potential damages) with a policy selected from six policy options, which are as follows:

- No active intervention;
- Reduce existing flood risk management actions;
- Manage flood risks at the current level;
- Take further action to sustain the current level of flood risk into the future;
- Take further action to reduce flood risk; and
- Take action with other to store water or manage run-off for overall flood risk reduction or environmental benefits.

4.4.5 Once the preferred policies are identified, the CFMP then outlines a series of actions that should be implemented to help meet the policy requirement. The preferred policies for the various Policy Units are as follows:

- Mid and Upper Reaches – Policy 2, reduce existing flood risk management actions;
- Upper Ebbw – Policy 4, take further action to sustain current risk;

Flood Defences

4.4.6 Flooding may occur across areas of Blaenau Gwent affecting people, buildings, infrastructure or the economy. Where required, flood defences are typically focused in and around urban areas where for social, economic and sustainability reasons these are required to minimise disruption to individuals, businesses and the wider community.

4.4.7 The NFCDD (as identified in Section 3.3) is compiled by the Environment Agency and contains information on natural and man-made defences, including the standard of protection. The presence of formal raised man-made flood defences is relatively limited throughout Blaenau Gwent. However, some fluvial defences are present in and around the towns of Aberbeeg/Lanilleth, Abertilly and Cwm. Fluvial defences within the study area typically consist of formal raised man-made flood defences, in the form of a small number of relatively short reaches of walls or raised banks.

4.4.8 Figure 7 in Appendix A show the location of formal raised man-made flood defences and the standard of protection afforded in relation to individual candidate sites, which is typically in the order of an annual probability of 1% (1 in 100 year return period). Appendix D provides additional details on flood defences in the Blaenau Gwent area.

4.4.9 The DAMS for Blaenau Gwent have been produced to identify the areas benefitting from the presence of flood defences (i.e. zone C1). As shown by Figure 3 in Appendix A, areas of zone C1 exist in Abertillery, Aberbeeg, Cwm and Glandwr.

4.4.10 Although the DAMS take account of the presence of flood defences, the Environment Agency Flood Maps do not when delineating the Flood Zone extent. Therefore areas of land situated behind these defences are still attributed with a flood risk. The reason for this is that the presence of flood defences does not remove the risk for the areas protected as failure through overtopping

or breaching may occur, therefore, a residual flood risk remains. In addition, the flood defences themselves are not necessarily designed to protect against the 1% annual probability fluvial event flood, therefore, they would be overtopped during an event of this magnitude if the standard of protection is less than the 1% annual probability event. Where required, areas benefiting from defences will be investigated through the Stage 2 SFCA.

- 4.4.11 Railways and major roads may also provide informal flood defence structures that are not necessarily maintained as flood management infrastructure. As a result, these are not included within this section nor any figures produced as part of the Stage 1 SFCA. However, they may be referred to during more detailed site assessments as part of a site specific FCA.

Residual Risk

- 4.4.12 Whilst flood defences do offer significant benefit, residual risk must be considered during evaluation of suitable sites for development allocation. Residual risks are typically greater to areas immediately behind flood defences. Given the high-level nature of the Stage 1 SFCA, no assessment of residual risks has been made. It is suggested that an assessment of the likely flood routes associated with overtopping or infrastructure failure should form part of a site specific FCA or Stage 3 SFCA, where required. An appreciation of the actual or residual risk can therefore be identified through this process.

Flood Warning Areas

- 4.4.13 The Environment Agency operates a flood warning service in areas under their jurisdiction (i.e. Main Rivers) that are at risk of flooding, which is available on their website (<http://www.environment-agency.gov.uk>). There are four flood warning codes that indicate the level of severity of flooding expected to the area (**Table 5**).

Table 5: Environment Agency Flood Warning Codes

Flood Warning Code	Description
Flood Watch	Flooding of low-lying land and roads is expected. Make the necessary actions to prepare for a flood event.
Flood Warning	Flooding of homes and businesses is expected. Take immediate action.
Severe Flood Warning	Severe flooding is expected. Extreme danger to life and property is expected. Take immediate action.
All Clear	Flood watches or warnings are no longer in force for this area

- 4.4.14 Within Blaenau Gwent there are a number of Flood Watch areas. Flood Watch areas are hydrologically similar (or groups of catchments). Within each Flood Watch area are focussed areas, known as Flood Warning areas, where flooding is likely to occur during larger flood events. The Flood Watch and Flood Warning areas within Blaenau Gwent are displayed in Figure 8 in Appendix A – Figures.
- 4.4.15 The flood warnings are disseminated through a variety of mediums that include TV, radio, and Flood Warnings Direct, which is a service direct to a telephone, fax, pager and/ or internet. Loudhailers are also used in certain circumstances. There is also an emergency Floodline number (0845 988 1188) and a quick dial number for individual rivers.

- 4.4.16 The Environment Agency aim to give a minimum of two hours warning prior to the onset of a flood event. However the rapid onset of some flood events, for example after a breach in flood defences or following a period of high intensity rainfall, means that sufficient warning cannot always be realised. In addition, during localised storms on catchments or sub-catchments with a quick response time, providing up to two hours warning could prove particularly difficult.

4.5 Groundwater Flooding

- 4.5.1 Groundwater flooding occurs when the level of groundwater increases sufficiently so it rises above the level of the ground and causes flooding. It is often dependant on the underlying geology of an area and occurs following prolonged rainfall.
- 4.5.2 Groundwater levels are believed to rise and fall slowly within Blaenau Gwent. Therefore, groundwater levels are not a significant flood risk on a strategic scale within Blaenau Gwent. In addition, the local geology (predominantly Coal Measures, consisting of mudstones and siltstones) is not believed to yield significant quantities of groundwater. Coal Measures can present a flood risk in areas where rising mine water reaches the surface. However, in Blaenau Gwent, the majority of former mine sites are reworked and capped, thus reducing or negating the risk of rising mine water.
- 4.5.3 Inspection of the Environment Agency Groundwater Source Protection Zones (SPZ) within the study area has identified one large area which is located within an Inner Zone SPZ³. This indicates that there is a resource used for public water and that any potential pollutants could reach the borehole within 50 days. Whilst these areas are typically utilised to indicate areas where groundwaters are particularly susceptible to pollution (see Section 4.8.30 for additional details), they also indicate where groundwater levels have the potential to fluctuate. The Inner Zone SPZ is located along the northern area of the Blaenau Gwent CBC, stretching from north of Tredegar to north of Brynmawr (i.e. the foothills of the Brecon Beacons). It is likely that this designation is associated with the Limestone geology present in these areas.
- 4.5.4 In addition to the SPZ maps, the Environment Agency have also produced Aquifer Designation maps indicating which geological strata could contain significant volumes of groundwater. Inspection of the Aquifer Designation maps indicates that the majority of the geology in Blaenau Gwent is classified as Secondary Aquifer B, meaning it is predominantly lower permeability but may yield water in fissures. This designation is consistent with the information presented in Section 2.5.

Groundwater Flood Risk Management

- 4.5.5 Historically, groundwater flooding has been relatively unknown in terms of predicting when and by how much it will cause flooding. This, coupled with the limited known sources of groundwater flooding within Blaenau Gwent has meant that there are limited management practices in place to reduce the impact of groundwater flooding.

4.6 Flooding from Artificial Sources

- 4.6.1 Artificial waterbodies such as canals and reservoirs present a different flood risk to potential development than more natural watercourses or water bodies. The inflows/outflows to a canal or

³ <http://www.environment-agency.gov.uk/homeandleisure/37805.aspx>

reservoir are generally controlled by weirs, sluices or similar structures. In addition, they often have the capacity to store water thus attenuating the peak flood flow and reducing the risk of flooding to downstream areas. As a result of these factors, areas adjacent to artificial water bodies and watercourses face different flood risk constraints to areas adjacent to more natural watercourse or water bodies.

Reservoirs

- 4.6.2 The Environment Agency has provided records of reservoirs within Blaenau Gwent (see Table 4). In addition, the data provided indicates whether each reservoir is impounded or not. Generally, impounded reservoirs present potentially significant flood risk should the impounding structure breach or fail.
- 4.6.3 The reservoir data is only available for reservoirs that fall within their jurisdiction and therefore operate under the Reservoirs Act 1975, i.e. those that store over 25,000m³. Additional, smaller storage areas may be present across the study area that could present a potential flood risk. However, due to data limitations on a strategic scale, these have not been included within this Stage 1 SFCA but should be investigated as part of a site specific FCA, where appropriate.
- 4.6.4 As with the method of assessment of flood risk from the artificial watercourses, any potential development site located down gradient of a reservoir would be identified as being at potential risk from reservoir flooding. Given the nature of the flooding associated with a sudden release of a large volume of water, the consequences of such flooding could be significant. However, the risk of such an event occurring is very low.

4.7 Surface Water and Surcharged Drainage Flooding

TAN15 Requirements

- 4.7.1 The majority of the guidance provided by TAN15 relates to the impact arising from fluvial and tidal flooding. However, the document (in particular, Section 7 – Assessing Flood Consequences) outlines a need to assess the consequences arising from other forms of flooding such as surface water flooding.
- 4.7.2 Specific guidelines with respect to surface water within TAN15 involve the mitigation and management of surface water runoff arising as a result of new development. These aspects are covered in Section 4.8 of this SFCA report.

Historical Flooding

- 4.7.3 Liaison with the relevant stakeholders has indicated that surcharged drainage is not a major issue throughout the County. As outlined in Section 3.3, various stakeholders provided information relating to historical flood events arising from surface water or overland flow. Of particular relevance is the data provided by Dŵr Cymru Welsh Water in relation to their DG5 register of flooding incidents caused by overloaded surface water sewers. The data provided has been collated onto GIS, the results of which are shown in Figure 6 of Appendix A. In addition, the GIS database includes information relating to the approximate return period of each flooding incident, where known. According to the DG5 register, the approximate areas with the highest number of recorded incidents are:

- Waunlywd, Ebbw Vale;

- Market Street, Tredegar;
- Commercial Road, Aberbeeg/ Llanhilleth;
- Rhyd Clydach, Brynmawr; and
- King Street, Tredegar.

Known Surface Water Problem Areas

4.7.4 Through liaison with the various stakeholders, it is evident that surface water flooding is not a significant flooding mechanism for many areas throughout Blaenau Gwent (fluvial flooding is considered to present a more significant risk). Generally, surface water issues in the county tend to be localised and caused by ponding, sewer blockages or capacity issues. However, some areas are known to experience surface water flooding issues. These have been identified by Blaenau Gwent Emergency Planners and Drainage Engineers as Critical Drainage Areas, and are located within the vicinity of the following areas:

- Ebbw Vale, near Mount Pleasant Road (very low magnitude);
- Ebbw Vale, near to 'The Walk' Retail Centre (low magnitude);
- Brynmawr, in the vicinity of the Market Square (very low magnitude);
- Llanhilleth, Commercial Road (low magnitude);
- Llanhilleth, Glandwr Street (very low magnitude).

Areas Susceptible to Surface Water Flooding

4.7.5 In 2009, the Environment Agency provided all Local Authorities in England and Wales with maps indicating the Areas Susceptible to Surface Water Flooding (ASTSWF) within the LPA areas.

4.7.6 The ASTSWF maps show areas that are potentially susceptible to flooding from surface water sources. They were developed for the Environment Agency at a national level to provide surface water flooding information to Local Resilience Forum (LRF) partners and the Welsh Assembly Government (WAG). The map data is a deliverable from the Pitt Review of the summer 2007 floods. The flood risks posed are defined in three bandings, 'less', 'intermediate' and 'more' susceptible. Given the national scale of the maps, their use at a local scale should be treated with caution.

4.7.7 The Environment Agency has produced a guidance document for Local Planning Authorities for use in planning. This guidance document states that *'..it is anticipated that Inspectors will wish each LPA to confirm that it has taken the information in the maps into account and be able to inform him/her of the implications for all sites allocated in the LDP'* (Environment Agency, 2009).

4.7.8 In addition, the guidance document explains the role of the ASTSWF maps in the LDP process. The salient recommendations of the guidance document are:

- Maps should indicate where more detailed studies may be appropriate;
- They are not appropriate to act as the sole evidence for any specific planning decision without further evidence;
- Other data such as that collated as part of the SFCA or data from the DCWW should be used to indicate where further assessment may be necessary.

- 4.7.9 Given the sensitivity of the data associated with the maps, they cannot be disseminated at a local scale (i.e. using 1 to 10,000 scale mapping) but can be provided at a higher-level scale. Therefore, a map showing the distribution of ASTSWF in Blaenau Gwent has been provided in Figure 6 of Appendix A.
- 4.7.10 In order to ensure the emerging LDP and candidate site assessment process is sufficiently sound, an analysis of the ASTSWF maps in relation to candidate sites has been included within the methodology of this SFCA. Section 5.2 provides additional information on the site analysis methodology.

4.8 Management of Surface Water and Drainage Flooding

Principles

- 4.8.1 Traditionally, built developments have utilised piped drainage systems to manage storm water and convey surface water runoff away from developed areas as quickly as possible. Typically these systems connect to the public sewer system for disposal to local watercourses and/or treatment. Whilst this approach rapidly transfers storm water from developed areas, the alteration of natural drainage processes can potentially impact on downstream areas by increasing flood risk and reducing water quality. Receiving watercourses are therefore much more sensitive to rainfall intensity, volume and catchment land uses after a catchment or areas of a catchment have been developed.
- 4.8.2 Due to the difficulties associated with improving sewer systems it is uncommon for sewer and drainage systems to keep pace with the rate of development or redevelopment and there are increasingly stringent controls placed on discharges to watercourses. As development progresses or urban areas expand these systems become inadequate for the volumes and rates of storm water they receive, often resulting in increased flood risk and degradation of water quality. Allied to this are the implications of climate change on rainfall intensities, leading to flashier catchment and site responses and surcharging of piped systems.
- 4.8.3 In addition, as flood risk has increased in importance within planning policy, a disparity has emerged between the design standard of conventional sewer systems (3.3% annual probability, or 1 in 30 year) and the typical design standard flood (1% annual probability, or 1 in 100 year). This results in drainage inadequacies for the flood return period developments need to consider, often resulting in potential flood risk from surface water/combined sewer systems.
- 4.8.4 A sustainable solution to these issues is to reduce the volume and/or rate of water entering the sewer system and watercourses.

Sustainable Drainage Systems (SuDS)

- 4.8.5 SuDS are the preferred method of TAN15 to manage surface water runoff generated from developed areas. They seek to manage surface water as close its source as possible and therefore act as a natural drainage system. Typically, this involves moving away from traditional piped systems and using 'soft' engineered solutions.
- 4.8.6 In order to comply with the requirements of TAN15, the Environment Agency and Blaenau Gwent CBC, proposed drainage systems (preferably via the use of SuDS) should be designed to ensure effective operation up to and including the 1% annual probability design standard flood including a reasonable increase in rainfall intensity to account from climate change (typically +30%).

- 4.8.7 Wherever possible, SuDS techniques should seek to contribute to each of the three goals identified below with the favoured system contributing significantly to each objective. Where possible SuDS techniques for a site should seek to:
- Reduce flood risk (to the site and neighbouring areas);
 - Reduce pollution; and,
 - Provide landscape and wildlife benefits.
- 4.8.8 These goals can be achieved by the SuDS management train, a hierarchical approach outlined in The SuDS Manual (CIRIA report C697), where each component adds to the performance of the whole system. The hierarchy is as follows:
1. Prevention - Good site design and upkeep to prevent runoff and pollution (e.g. limited paved areas, regular pavement sweeping);
 2. Source control - Runoff control at or near to source (e.g. rainwater harvesting, green roofs, pervious pavements);
 3. Site control - Water management from a multitude of catchments (e.g. route water from roofs, impermeable paved areas to one infiltration or holding site); and,
 4. Regional control - Integrate runoff manage from a number of sites (e.g. into a detention pond).
- 4.8.9 In keeping with the guidance of TAN15, local authorities should encourage the application of SuDS techniques. This section presents a summary of the more commonly used SuDS techniques currently available and a review of the soils and geology of the study area. This will enable the Blaenau Gwent CBC to identify where SuDS techniques could be employed in development schemes.
- 4.8.10 The application of SuDS techniques is not limited to one technique per site. Often a successful solution will utilise a number of techniques in combination, providing flood risk, pollution and landscape/wildlife benefits. In addition, SuDS can be employed on a strategic scale, for example with a number of sites contributing to large scale jointly funded and managed SuDS, however, each development site must offset its own increase in runoff and attenuation cannot be “traded” between developments.
- 4.8.11 Design guidance can be found in Sewers for Adoption, 6th Edition (WRC, 2006), the SuDS Manual (CIRIA report C697), and associated Site Handbook for the Construction of SuDS (CIRIA report C698). These publications provide best practice guidance on the planning, design, construction, operation and maintenance of SuDS, to ensure effective implementation within developments.

SuDS Policies

- 4.8.12 This section outlines the main policy documents that encourage the implementation of SuDS.

TAN15

- 4.8.13 Appendix 4 of TAN15 provides relatively detailed information and advice with regard to the use and implementation of SuDS as part of a proposed development site's surface water management scheme. The descriptive information provided in TAN15 mirrors that which is

included in the various SuDS guidance document and has been summarised within this section of the SFCA report.

- 4.8.14 TAN15 encourages the consideration of SuDS early in the planning process through the liaison between planners and architects, the LPA, Environment Agency, highways authorities and sewerage undertakers. TAN15 also states that the planning system can further the use of SuDS by:
- Incorporating favourable strategic or local policies within development plans;
 - Persuading developers to adopt SuDS where practical, through the use of planning conditions and agreements; and
 - Encourage the implementation of SuDS through the development of strategies in collaboration with the Environment Agency.

Code for Sustainable Homes

- 4.8.15 The Code for Sustainable Homes identifies reduction of surface water runoff and flood risk as a component towards achieving a rating of between Level 1 to Level 6 (with Level 6 being the most sustainable). The surface water element is worth up to two credits within the scoring system. Through incorporating suitably designed systems into a development, SuDS can also contribute to other assessment criteria under Code for Sustainable Homes including ecology and potable water consumption.

SuDS Design

- 4.8.16 SuDS techniques can be used to reduce the rate and volume of surface water runoff and improve the water quality of surface water discharges from sites to the receiving environment (i.e. natural watercourse or public sewer etc).
- 4.8.17 As per the requirements of TAN15, the design of SuDS measures should be undertaken as part of the drainage strategy and design for a development site. A ground investigation, including appropriate infiltration testing would be required to assess the suitability of using infiltration measures, with this information being used to assess the required volume of on-site storage. Hydrological analysis should be undertaken using industry-approved procedures, to ensure a robust design storage volume is obtained.
- 4.8.18 During the design process, liaison should take place with the LPA and the Environment Agency in order to establish that the design methodology is satisfactory and to also agree on a permitted rate of discharge from the site. For example, the Environment Agency typically recommends a catchment wide surface water runoff restriction direct to Main Rivers within Blaenau Gwent. This restriction is 10l/sec/hectare unless agreed otherwise.
- 4.8.19 A key consideration of SuDS design is the maintenance regime to ensure they operate effectively, which should be sufficiently detailed and agreed at the design stage. The maintenance regime should set out a framework with a clear identification of responsibility for the lifetime of the proposed development.

Table 6 Summary of SuDS techniques and their suitability to meet the three aims for sustainability

Management Train	Component	Description	Water Quantity	Water Quality	Amenity Biodiversity	
Regional	Site	Source	Green roofs	●	●	●
			Rainwater harvesting	●	○	○
			Permeable pavements	●	●	○
			Filter drains	●	●	x
			Infiltration trenches	●	●	x
			Soakaways	●	●	x
			Bio-retention areas	●	●	●
			Swales	●	●	○
			Sand filters	●	●	x
			Basins	●	●	○
Ponds	●	●	●			
Wetland	●	●	●			

Key: ● – highly suitable, ○ - suitable depending on design, x - not suitable

SuDS Utilisation within Blaenau Gwent

- 4.8.20 The underlying ground conditions of a development site will often determine the type of SuDS approach to be used at development sites. In order for a robust assessment to be undertaken and to inform detailed drainage designs, full ground investigations and infiltration testing should be undertaken. However, the information provided within this section can provide a reasonable summary and starting point for the potential use of SuDS throughout Blaenau Gwent.
- 4.8.21 Based on a review of the BGS geological dataset potentially suitable SuDS techniques that would have been identified that are likely to be suitable based on the underlying geology. This is summarised in, Table 7 and Table 8 below. The information contained within the tables and this section represents a guide that should not be used to accept or refuse SuDS techniques.

Table 7 Summary of SuDS use in Blaenau Gwent according to bedrock types

SuDS Technique	Permeability	Geology	Location
Infiltration	Moderate/High	Limestones	Located in the far northern areas
Infiltration or Combined Infiltration and Attenuation	Low/Moderate	Millstone Grit Group	Located in the northern areas, to the north of Tredegar and Ebbw Vale
	Low/Moderate	South Wales Coal Measures Group	Predominant bedrock located across the central and southern areas.

Table 8 Summary of SuDS use in Blaenau Gwent according to superficial deposit types

SuDS Technique	Permeability	Geology	Location
Infiltration or Combined Infiltration and Attenuation	Low/Moderate	Glacial Till	Predominant drift deposits located along valley bases throughout the study area. Also relatively extensive in some northern areas (Tredegar and Ebbw Vale)
	Low/Moderate	Alluvial Deposits	Outcrops along valley bases, e.g. Cwm and the southern extent of Tredegar
	Variable (Low to High), depending on structure	Head Deposits	Ebbw Fawr and Ebbw Fach valleys near Blaina/ Penybont (Abertilly) and Waunlwyd/ southern Ebbw Vale
Attenuation	Low	Peat	Outcrops throughout the northern areas, north of Tredegar and Ebbw Vale

- 4.8.22 As shown in Table 7 and Table 8, there is likely to be variable infiltration rates throughout Blaenau Gwent but with limited areas of obvious high infiltration. In addition, the SuDS technique applicable to an area or location could be dependant on the thickness or presence of the superficial deposits or soils.

SuDS Constraints

- 4.8.23 There are several constraints that may limit the application of SuDS. These will vary between locations and may include:
- Ground contamination;
 - Ground conditions or infiltration rates;
 - Ground use / vulnerability;

- Capacity of the receiving watercourse.

Ground Contamination

- 4.8.24 Ground contamination has the potential to contaminate groundwater and/or surface water resources if incorrectly managed. This could be particularly prevalent in the northern extents of the study area, where an Inner SPZ is located. In some cases the nature of the ground contamination may be such that certain types of SuDS (e.g. infiltration techniques) are not appropriate. Ground contamination should be determined by site investigation on a site by site basis.

Groundwater Use / Vulnerability

- 4.8.25 Groundwater resources can be vulnerable to contamination from both direct sources (e.g. into groundwater) or indirect sources (e.g. infiltration of discharges onto land). Groundwater vulnerability within the study area has been determined by the National Rivers Authority (now the Environment Agency), based on a review of aquifer characteristics, local geology and the leaching potential of overlying soils. To identify the groundwater vulnerability on and surrounding a potential development site the map reference below covers the study area:

- National Rivers Authority (now the Environment Agency) Groundwater Vulnerability Map.

- 4.8.26 The vulnerability of the groundwater is important when determining the suitability of SuDS. The Environment Agency are the responsible drainage authority for any discharges to controlled waters, including groundwater and surface waters and should be consulted on proposals to discharge to ground.

- 4.8.27 As identified in Section 4.5, the Environment Agency has produced Aquifer Designation maps to identify the potential for underlying geology to support significant volumes of groundwater. The majority of the geology in Blaenau Gwent is deemed to be Secondary Aquifer B and as such would not restrict SuDS on account of it not containing significant volumes of groundwater. However, Secondary Aquifer B geological strata typically have lower permeability, which may restrict the use of infiltration type SuDS measures.

Groundwater Source Protection Zones

- 4.8.28 As outlined in Section 4.5, SPZs are defined to protect areas of groundwater that are used for potable (drinking) supply, including public/private potable supply, (including mineral and bottled water) or for use in the production of commercial food and drinks.

- 4.8.29 Depending on the nature of the proposed development and the location of the development site with regards to the SPZs, restrictions may be placed on the types of SuDS appropriate to certain areas. Consideration should be given to the SPZs when determining the suitability of SuDS for development sites.

- 4.8.30 SPZs are defined based on the time it takes for pollutants to reach an abstraction point. This transmission time enables the Environment Agency to define zones around a groundwater abstraction point. The four zones are:

- Zone 1 (Inner Protection Zone) – This is defined as ‘any pollution that can travel to the borehole within 50 days from any point within the zone is classified as being inside zone 1’. Developments proposed within this area are likely to have the tightest constraints on SuDS.

- Zone 2 (Outer Protection Zone) – This is defined as the area that ‘covers pollution that takes up to 400 days to travel to the borehole, or 25% of the total catchment area – whichever area is the biggest’.
 - Zone 3 (Total Catchment) - The total catchment is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.
 - Zone 4 (Zone of special interest) – In the study area a fourth zone has been defined. ‘This is usually where local conditions mean that industrial sites and other polluters could affect the groundwater source even though they are outside the normal catchment area’. These areas are likely to have the least constraints on SuDS.
- 4.8.31 Inspection of the available data has identified one area of Blaenau Gwent CBC located within a SPZ. This indicates that there is a resource used for public water supply that should be safeguarded from potential pollution. This SPZ covers a relatively large area along the northern extent of the study area, stretching from north of Tredegar to north of Brynmawr. There is little existing or proposed development located on this SPZ.

Other Constraints

- 4.8.32 There are a number of other potential constraints to the use of SuDS that should be investigated as part of a proposed development, these are summarised as follows:
- The depth of the groundwater table;
 - Site slopes;
 - Surface water run-off quality and quantity;
 - Site restrictions;
 - Maintenance requirements;
 - Economical viability; and,
 - Ecological considerations.

Planning Considerations for SuDS

- 4.8.33 The application of SuDS may require space on development sites to be set-aside. Early consideration of SuDS will assist in determining the space required and identify methods to spread the management of storm water throughout a site using the Management Train principle presented in the SuDS Manual (CIRIA report C697).
- 4.8.34 The design of SuDS measures should be undertaken as part of a drainage strategy proposed during the master planning of development sites. A ground investigation will be required to access the suitability of using infiltration SuDS, with this information also being used to assess the required volume of on-site storage.
- 4.8.35 All relevant organisations should meet at an early stage of the drainage design process to agree on the most appropriate drainage system for the particular development. These organisations may include the Local Authority, the sewerage undertaker, Highway Agency, and the Environment Agency. Liaison with these organisations should focus on establishing a suitable design methodology, any restrictions and provision for the long-term maintenance of the features.

- 4.8.36 The most convenient vehicle for agreeing long-term management responsibilities is through Section 106 of the Town and Country Planning Act. Under this, agreement for SuDS maintenance can be a requirement of the planning application, forcing the issue to be addressed.

4.9 Other Flood Risk Management

Emergency Planning

- 4.9.1 When extreme flood events occur it is essential to have an emergency plan in place to provide clear procedural instructions. The mobilisation and organisation of the emergency services and supporting agencies is required to rescue, treat and transport potentially large numbers of people. During and after a flood event the role of the Local Authority includes providing transport for the evacuees and safe rest centres to house people in the event of homes being flooded. Further health and welfare issues are inevitable as a result of serious flood event.
- 4.9.2 The Gwent Local Resilience Forum have produced a 'Community Risk Register' under the Civil Contingencies Act 2004 (Contingency Planning) Regulations 2005. This 'live' document indicates the hazard, likelihood and the impact for a range of risks including flooding from various sources (e.g. fluvial, tidal, surface water or dam failure) and on a local and regional scale. The risk register indicates that the higher the impact rating a flood event has, the lower the likelihood and vice versa. The various flood events typically have a 'High' or 'Very High' risk rating. In order to respond to a flood event, the risk register refers to the existing Flood Watch and Flood Warning as well as area-wide flood plans already in place. It recognises the Environment Agency as the lead authority.
- 4.9.3 In addition to the Community Risk Register, the Gwent Local Resilience Forum Flood Group have produced a Gwent Flood Arrangements report. The Flood Arrangements report covers the Gwent Police administrative area, which includes Blaenau Gwent. The document provides a summary of flood risks within the Gwent area as well as how these should be managed and mitigated by the various emergency services and authorities should respond during a flood incident. Table E1 in Appendix E summarises the various roles and responsibilities of authorities as identified by the Flood Arrangements report. Whilst this provides a summary of the various roles and responsibilities of various authorities, the list is not exhaustive and further information is available within the report itself or via the authorities involved.

5 Future SFCA Work

- 5.1.1 The main aims of this Stage 1 SFCA is to provide an overview of flooding issues within the Blaenau Gwent LPA administrative area and for Blaenau Gwent CBC to be able to undertake the justification test aspect of TAN15. Blaenau Gwent CBC have identified various candidate sites of potential strategic significance as part of their emerging LDP (see Appendix B for more details).
- 5.1.2 The next step in the Blaenau Gwent SFCA process is to undertake the Stage 2 SFCA. This will involve undertaking a more detailed assessment of flood risks to the proposed strategic candidate sites. As some of the strategic candidate sites may potentially have relatively low flood risks posed to them (e.g. within DAMS zone A and no know history of flooding), some initial screening has been applied to identify those that should be assessed as part of the Stage 2 SFCA. This has 'screened in' the candidate sites with a potentially significant flood risk posed to them and 'screened out' the sites at potentially low risk of flooding.
- 5.1.3 It was deemed that the most effective method of screening was to use the information collated within this Stage 1 SFCA to identify the potential flood risk posed to each strategic candidate site before deciding whether it would require further study as part of the Stage 2 SFCA.

5.2 Screening Process

Pre-SFCA Screening

- 5.2.1 Prior to this Stage 1 SFCA being commissioned, Blaenau Gwent CBC undertook some initial screening of potential candidate sites to remove any sites that were at significant risk of flooding, where possible.
- 5.2.2 This initial screening process removed two potential sites that were deemed to be unjustifiably located within areas at significant flood risk. As shown in Table 9 below, the number of candidate sites located within the Environment Agency Flood Zone 2 or 3 is relatively low. Those that are located within such Flood Zones are either partially located within them or have been selected due to either longstanding commitments as development sites or are required to meet the ongoing social, economic and sustainability requirements of the local communities. Hence, it is deemed that the Council have utilised a sequential approach to choosing candidate sites, taking into consideration flood risks without blighting the ongoing regeneration requirements of the communities.

SFCA Screening

- 5.2.3 As mentioned in paragraph 3.3.2 above, this SFCA has not considered the candidate sites that are already under construction or have planning permission already granted.
- 5.2.4 This SFCA has utilised four main criteria in the site screening process, identified as:
5. Site located within a DAM flood zone;
 6. Site located within an Environment Agency Flood Zone;
 7. Significant portion of the site located within an ASTSWF area;
 8. Locally derived data suggests flooding issues at the site.

- 5.2.5 The first criterion for screening the strategic candidate sites is identifying whether they are located within DAM zones B or C. However, as these maps were last updated in 2009, it is deemed prudent to utilise the more regularly updated Environment Agency Flood Maps as the second screening criterion. Therefore, if the sites are located within an Environment Agency defined Flood Zone 2 or 3; they would be screened 'in' to the Stage 2 SFCA.
- 5.2.6 Location within DAM zone A or Environment Agency Flood Zone 1 would screen the site 'out' of the Stage 2 SFCA, unless local evidence collated by this Stage 1 SFCA suggests the site may be at risk from flooding other than from rivers. Hence criteria 3 and 4 have also been utilised.
- 5.2.7 Given the high-level and therefore relatively crude nature of the ASTSWF maps, stringent analysis of candidate sites in relation to these maps would not necessarily be proportionate to the risks indicated by them. Therefore, the screening process of this SFCA has utilised the following methodology. Candidate sites would be 'screened in' to the Stage 2 SFCA if it meets following criteria:
- More than 50% of the site is located within an 'Intermediate' or 'Less' susceptible ASTSWF zone; and/or
 - Any part of the site is located within a 'More' susceptible ASTSWF zone.
- 5.2.8 The final criteria in the site screening process is the location of historical data suggesting flooding issues are present in the vicinity of a particular site. This would utilise the data collected as part of the Stage 1 SFCA such as South Wales Fire and Rescue responses, DCWW registers and Blaenau Gwent CBC drainage engineers and emergency planners information.
- 5.2.9 Should a site be not included within the Stage 2 SFCA, it doesn't necessarily mean there are no flood risks associated with it. Therefore, the LPA should still ensure it manages flood risks under the guidance of the SFCA, e.g. utilising sustainable drainage systems. Where relevant, this should be undertaken via a site-specific FCA written to adhere with TAN15 and reviewed by both the Environment Agency and Blaenau Gwent CBC.

Table 9: Screening of candidate development sites for inclusion within the Stage 2 SFCA

Town/ Settlement	Description	Candidate Site Reference Number	Approx. Area (ha)	Area within DAM flood zone (% of site)			Area within Environment Agency Flood Zone (% of site)			Area Within ASTSFW (% of site) Less Inter More	Historical Evidence of Flooding	Inclusion in Stage 2 SFCA?		
				A	B	C	1	2	3				Less	Inter
Ebbw Vale	Ebbw Vale North	MU1	48.7	99	0	1	99	0	1	15.0	5.0	1.0	DCWW and SWF&R within 400m	Yes
	Waun-y-Pound	B31	6.3	100	0	0	100	0	0	11.0	9.0	2.0	None	Yes
	Marine Colliery	B34	5.29	1.5	98.5	0	1.5	98.5	0	21.6	25.1	18.1	None	Yes
Tredegar	Cartref Aneurin Bevan	A25	0.38	100	0	0	100	0	0	82.0	13.0	0.0	DCWW and SWF&R – within 100m	Yes
	Greenacres	A26	0.5	100	0	0	100	0	0	11.7	24.2	21.9	DCWW within 300m, SWF&R – within 200m	Yes
	Jesmondene Stadium, Cefn Golau	A45	5.26	100	0	0	100	0	0	0.2	0	0	DCWW and SWF&R but downslope of site	No
Abertilly	Business Resource Centre, Tafarnaubach	A43	1.20	100	0	0	100	0	0	17.5	9.5	0.0	DCWW over 400m from site, across Head of the Valleys Road	No
	Tredegar Business Park	A14	3.05	77.4	19.1	3.5	77.4	19.1	3.5	6.6	28.9	44.7	EA, DCWW and SWF&R within 400m	Yes
	Tesco, Castle Street	D31	2.92	26.7	37.1	36.2	26.7	1	36.2	7.9	20.8	28.1	EA and DCWW within 100m	Yes
Upper Ebbw Fach	Land to the North of Winchestown, Nantyglo	C12	0.42	100	0	0	100	0	0	0	0	0	DCWW and SWF&R but 400m away and downslope	No
	NMC Factory and Bus Depot	MU3	2.95	100	0	0	100	0	0	33.0	14.0	0	None	No

			Area within flood zone (% of site)	Area within Environment Agency Flood Zone (% of site)	Area Within ASTSFW (% of site)	EA, DCWW and SWF&R within 300m							
North Rising Sun Industrial Estate	C19	3.12	95.5	0	4.5	0	0	0	0	EA, DCWW and SWF&R within 300m	Yes		
Adjacent to Blaen-y-Cwm School	C28	1.42	100	0	100	0	0	0	0	DCWW and SWF&R but over 400m from site	No		
Lower Ebbw Fach	D11	1.05	4.4	10.4	85.2	4.4	10.4	85.2	7.4	28.0	56.4	EA, DCWW and SWF&R within 300m	Yes
Roseheyworth Business Park	D22	2.56	65.5	34.5	0	65.5	34.5	0	39.0	5.7	0.0	None	Yes

5.3 SFCA Updates

- 5.3.1 The SFCA is intended to be a 'live' document and therefore should undertake regular and periodic review and updating to ensure that the information contained remains topical. Given the proposed GIS outputs of the SFCA, any updates would include the data collected as well as the various policies and guidance documents referred to throughout.
- 5.3.2 It is recommended that, following completion of the final SFCA, Blaenau Gwent CBC and the Environment Agency determine a suitable period for review and update of the SFCA that is acceptable to both parties. The updates should include:
- Updated and renewed Environment Agency Flood Maps, the SFCA data could be updated periodically to include Environment Agency data release;
 - Updated flood defence information, such as newly constructed defences or inspection details;
 - New or additional records of flood incidences from various stakeholders, e.g. Welsh Water DG5 records or South Wales Fire and Rescue Incidents (this data could be updated annually from relevant records); and
 - Any new or additional data that may not have been made available for this SFCA, e.g. if transportation authorities begin to record flooding incidents, this could be reviewed annually or datasets and GIS updated accordingly with new data releases.
- 5.3.3 It is recommended that the policy, legislation and document review section of the SFCA is updated annually, in line with the proposed LDP Annual Monitoring Report to include:
- Potential updates to planning policy, e.g. TAN15;
 - Updates and new releases of flood risk related legislation;
 - Updates of local flooding related documents and guidance, e.g. Eastern Valleys CFMP and the Gwent Flood Arrangements; and
 - Updates to other documents or guidance, e.g. other 'live' documents such as the Gwent Flood Arrangements, or new SuDS guidance notes.

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Appendix A – Figures

Figure 1– Overview of area and Candidate Sites of Potential Strategic Significance

Figure 2 – Overview of major strategic water features within Blaenau Gwent

Figure 3 – WAG DAMS within Blaenau Gwent

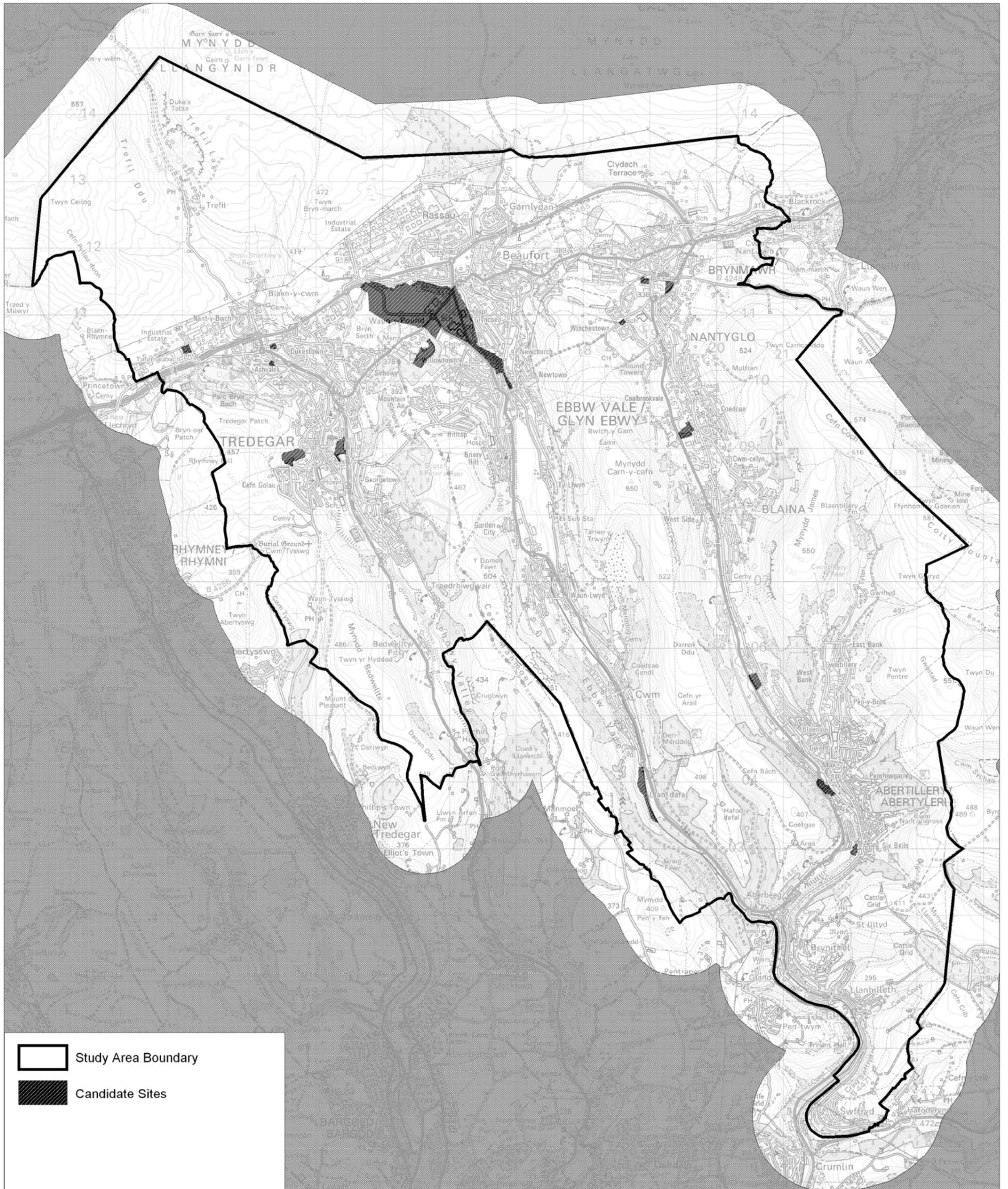
Figure 4 – Environment Agency Flood Zones 2 and 3 within Blaenau Gwent

Figure 5 – Location of recorded historic flood events in Blaenau Gwent

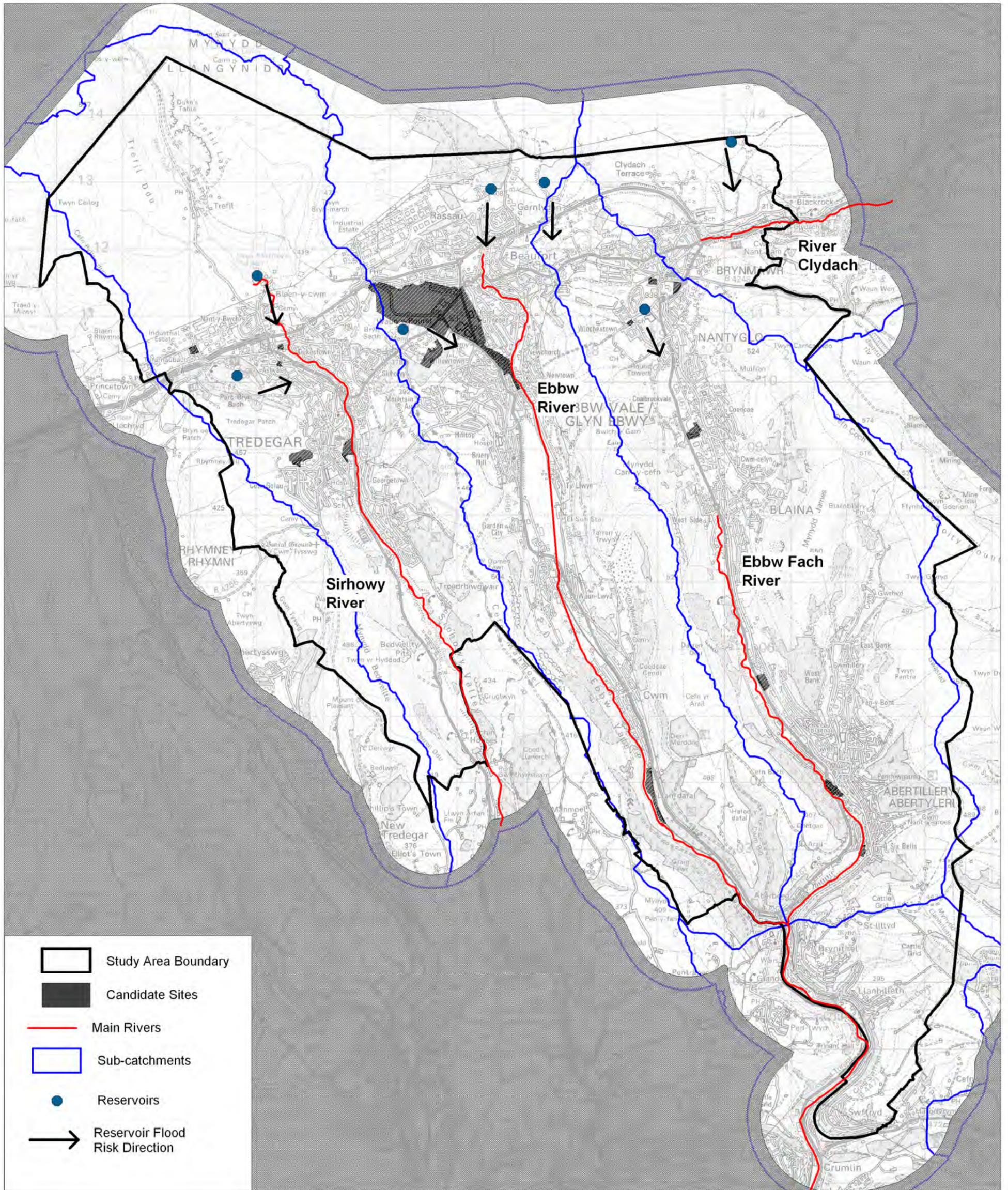
Figure 6 – Areas Susceptible to Surface Water Flooding within Blaenau Gwent

Figure 7 – Overview of formal flood defence provision within Blaenau Gwent

Figure 8 – Environment Agency defined Flood Watch and Flood Warning areas within Blaenau Gwent

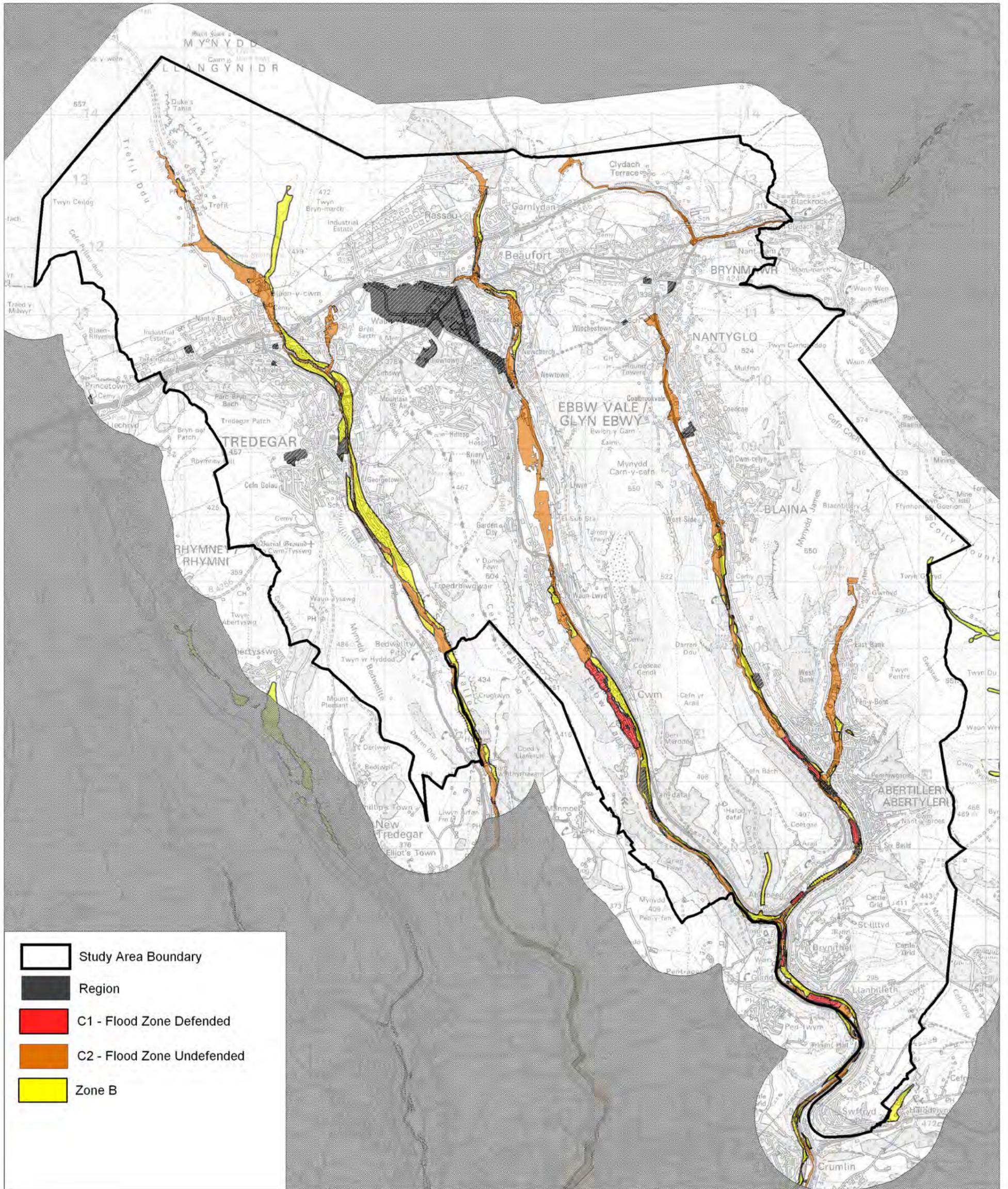


Project: Blaenau Gwent LDP - SFCA	Scale: 1:55000 @ A3	Drw: MJC	 www.scottwilson.com
Title: Overview of Study Area and Candidate Sites of Potential Strategic Significance	Figure 1	Date: 14/06/10	



Project: Blaenau Gwent LDP - SFCA	Scale: 1:55000 @ A3	Drw: MJC	 www.scottwilson.com
Title: Overview of Major Strategic Water Features Within Study Area	Figure 2	Date: 14/06/10	

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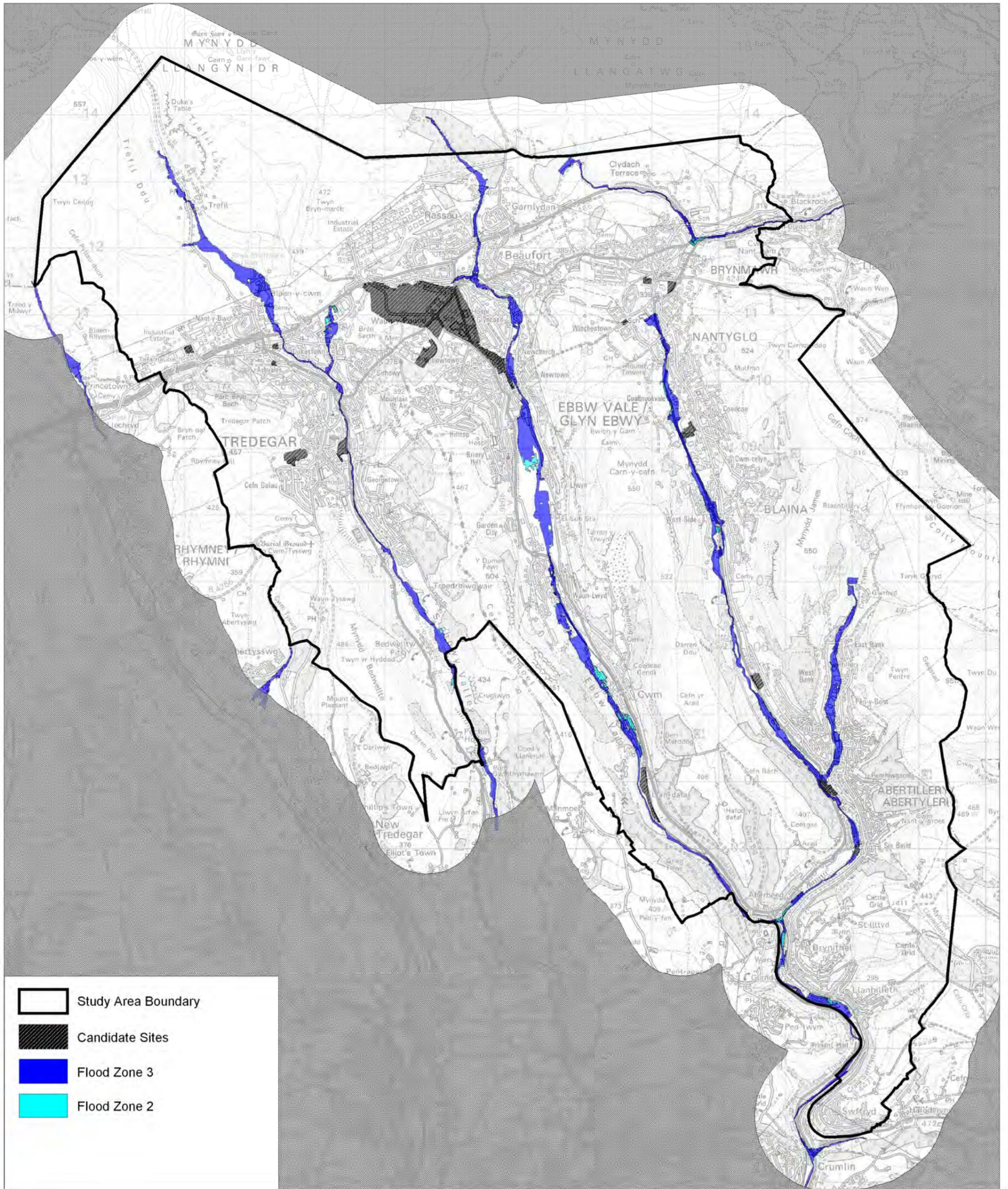
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Title:
Overview - WAG Dams

Figure 3



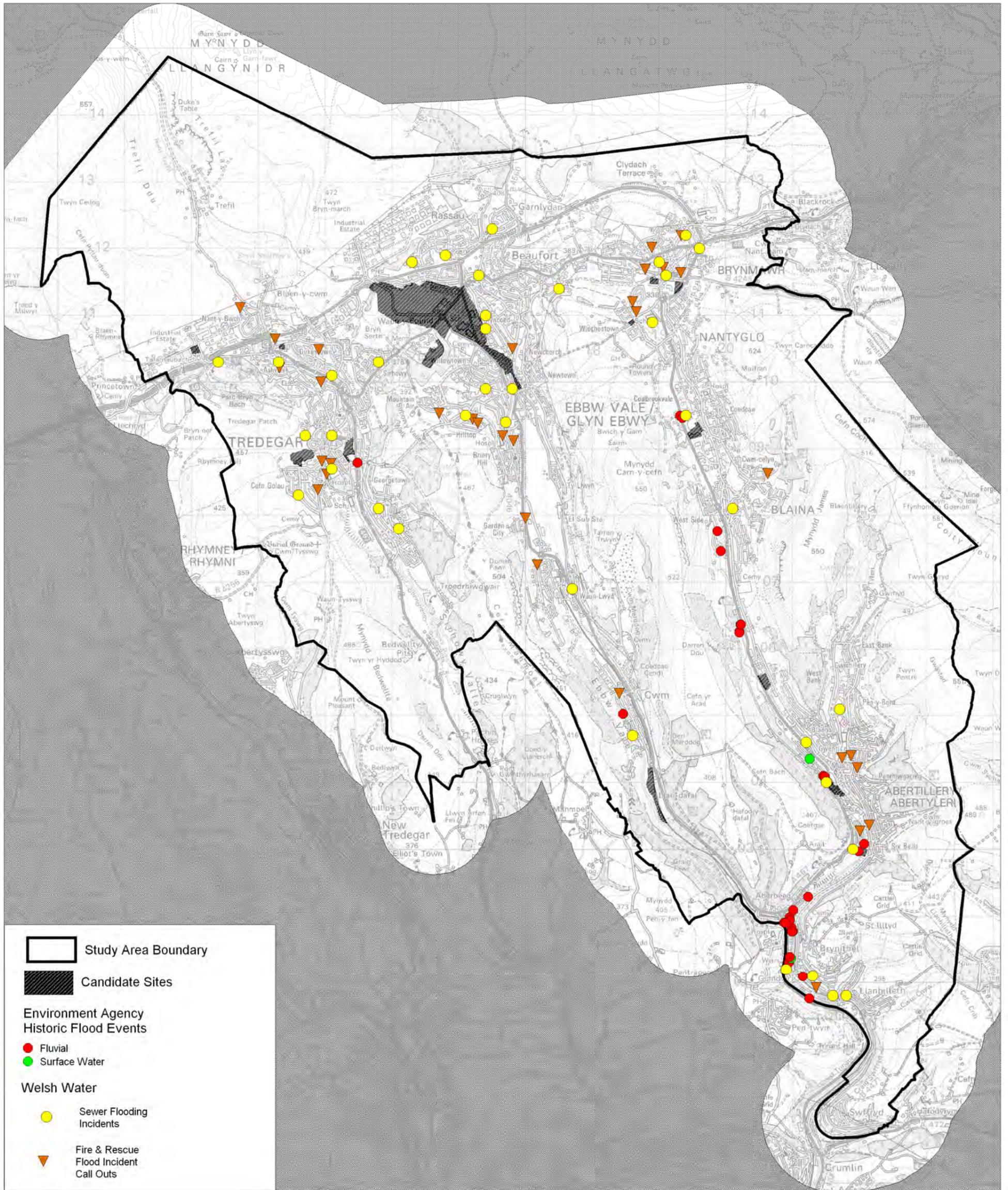
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	Study Area Boundary
	Candidate Sites
	Flood Zone 3
	Flood Zone 2

Project: Blaenau Gwent LDP - SFCA	Scale: 1:55000 @ A3	Drw: MJC	
		Date: 14/06/10	
Title: Overview - EAW Flood Zones 2 and 3	Figure 4		www.scottwilson.com

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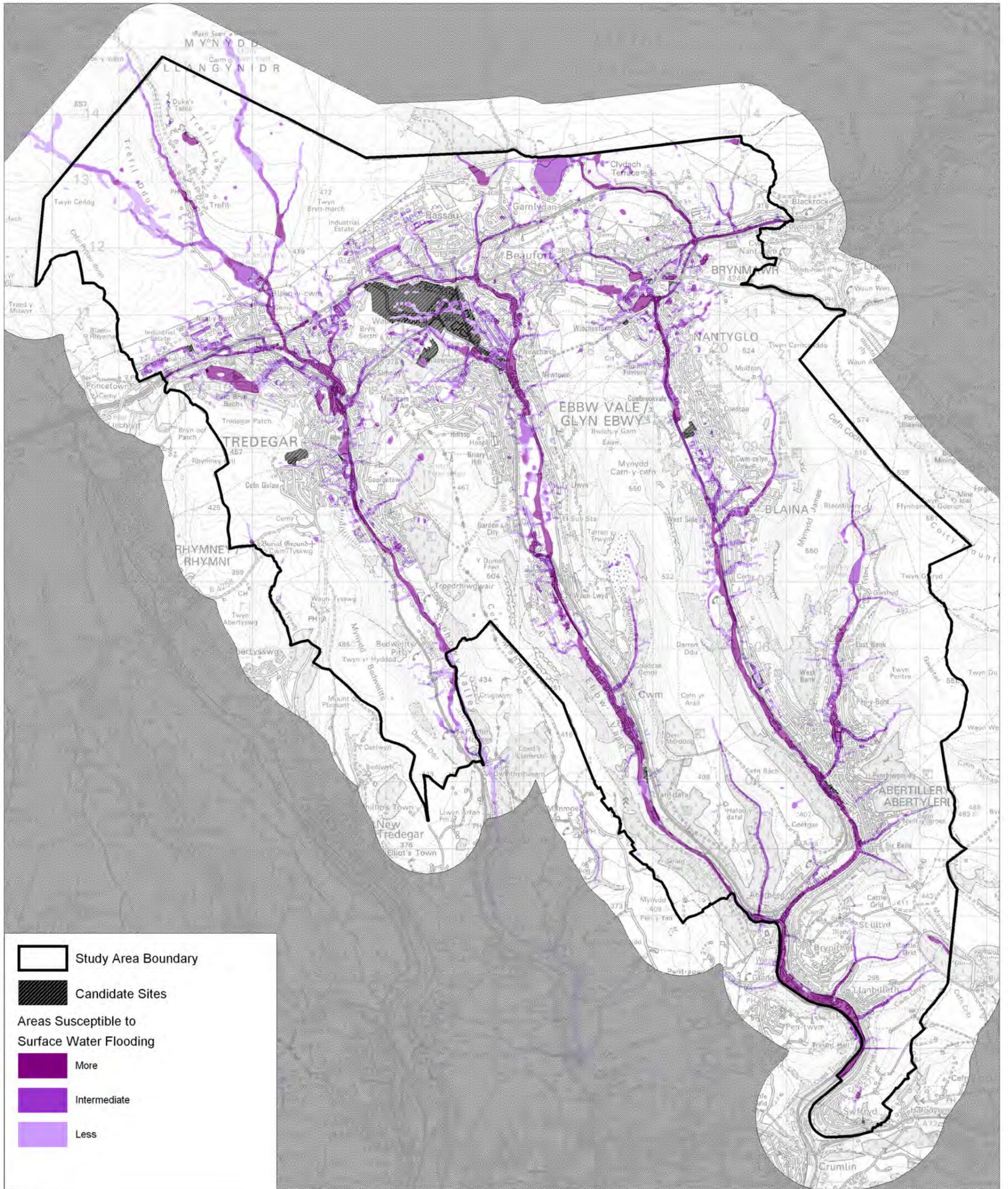
Date: 14/06/10

Title:
Historic and Potential Flood Sources

Figure 5



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Scale: 1:55000 @ A3

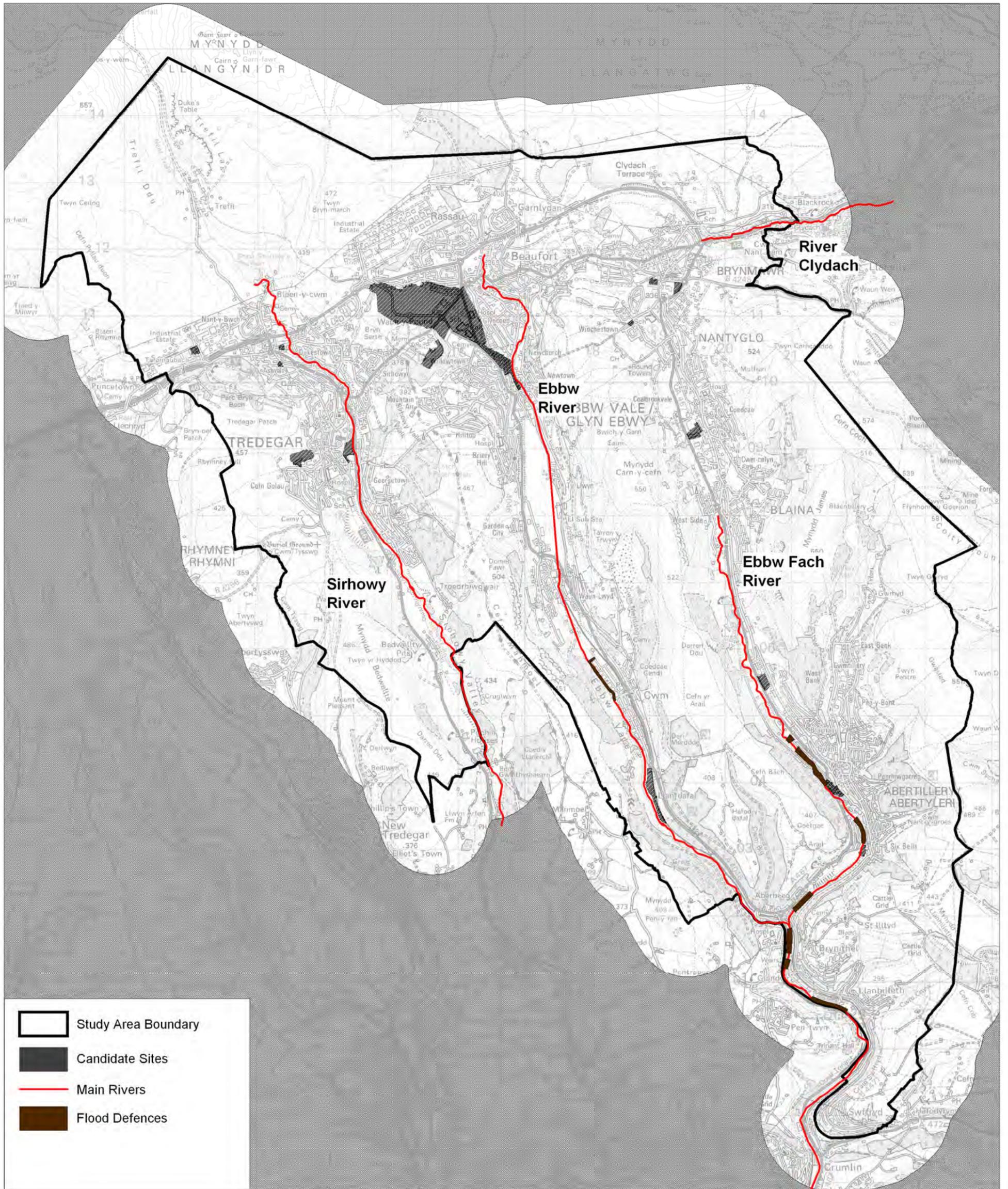
Drw:	MJC
Date:	14/06/10

Title:
Areas Susceptible to Surface Water Flooding

Figure 6

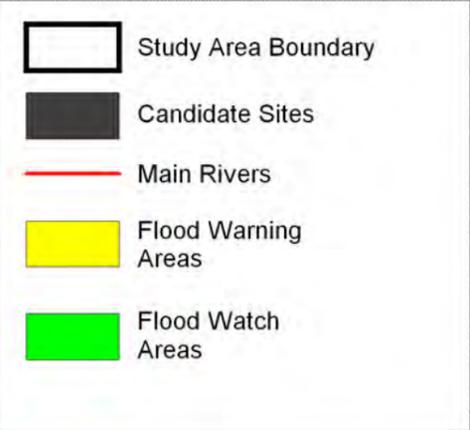
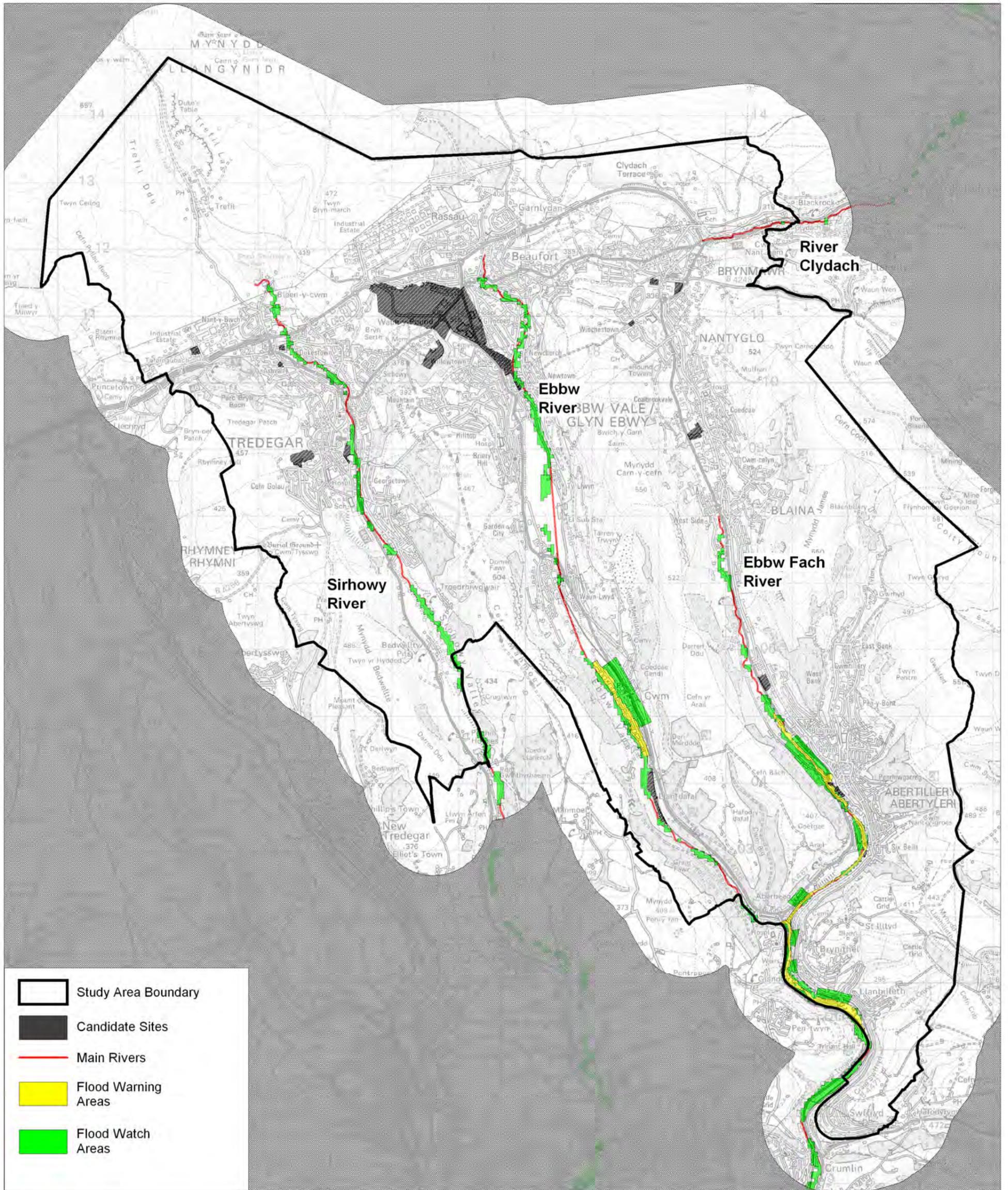


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-  Study Area Boundary
-  Candidate Sites
-  Main Rivers
-  Flood Defences

Project: Blaenau Gwent LDP - SFCA	Scale: 1:55000 @ A3	Drw: MJC	 www.scottwilson.com
Title: Overview of Flood Defence Provision	Figure 7	Date: 14/06/10	



Project: Blaenau Gwent LDP - SFCA	Scale: 1:55000 @ A3	Drw: MJC	
		Date: 04/06/10	
Title: Flood Warning and Flood Watch Areas	Figure 8		www.scottwilson.com

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Appendix B – Policy Review

A policy review of relevant national, regional and local policies has been undertaken in order to ensure this SFCA document is relevant and applicable within the context of all levels of policy.

Water Framework Directive

This European Union legislation was transposed into UK law in 2003. The fundamental requirement of the Water Framework Directive (WFD) is related to water quality, whereby it requires all watercourses to be of 'good status' by 2015. Flooding and flood risk management is a consideration of the WFD, particularly within the remit of managing surface water from new developments and management of coastal erosion and flood risk.

Severn River Basin District

The WFD is administered through River Basin Districts (RBD) with specific guidelines, policies and monitoring outlined within River Basin Management Plans (RBMP). Blaenau Gwent is located within the River Severn RBD with the final report released in December 2009.

The main remit of the Severn RBMP is to ensure the ongoing improvement of water quality of all waters within the Severn RBD. However, the RBMP highlights the links between the WFD and other legislation and policy such as the Floods Directive and Environment Agency CFMPs and Shoreline Management Plans (SMPs). In addition, the document identifies key contributions from various stakeholders to aid in ensuring all waters within the Severn RBD reach 'good status' by 2015 such as:

- Rural land managers: Ensure land management practices are undertaken so as to not exacerbate flood risks or can reduce flood risks;
- Environment Agency: Review redundant flood alleviation structures and identify appropriate mitigation, modification or removal; and
- Local and regional government: Improve management of surface water through the use of SuDS and develop Surface Water Management Plans, where appropriate.

Making Space for Water

The Government released Making Space for Water in March 2005 (DEFRA, 2005) after a consultation period. Its intention is to inform the development of a new strategy on the management of issues surrounding flood risk and coastal erosion for the next 20 years. The report recognises the requirement for a holistic approach between the various responsible bodies, including flood defence operating authorities, sewerage undertakers and highways authorities, to achieve sustainable development. Making Space for Water does not state specific policies but provides the Governments objectives on:

- Land use planning – it strongly encourages FCAs to be prepared at all levels of the planning process;
- Rural issues – it promotes the environmental pillar of sustainable development through the use of wetlands and washlands, and managed realignment of coasts and rivers;
- Integrated urban drainage management – it is committed to ensuring that SuDS techniques are incorporated in new developments;
- Coastal issues – it seeks to develop a more strategic and integrated approach to managing coastal flooding and erosion risks; and

Living with flood risk - it identifies that there is a need to raise awareness and preparation in local communities for the changing flood and erosion risks resulting from climate change. The protection of the functional floodplain forms an integral aspiration of the strategy.

Welsh Assembly Government High Level Targets

WAG has responsibility for flood defence policy in Wales and is committed to playing its part in wider Government policies for the protection of the environment and biodiversity. In April 2001, WAG set out its High Level Targets for flood and coastal defence to facilitate a more certain delivery of the Government's national policy aim and strategy for flood and coastal defence in Wales.

Planning Policy Wales

PPW provides the strategic land use planning policy framework for the effective preparation of Local Planning Authorities (LPAs) LDPs. PPW identifies the requirement for the planning system to move away from flood defence and the mitigation of the consequences of new development in areas of flood hazard, towards a more positive avoidance of development in areas defined as being of flood hazard. It also advocates that planning authorities adopt a precautionary approach when formulating policies on development and flood risk and when considering planning applications. The guidance also suggests that LPAs take a strategic approach to flood risk and consider the catchment as a whole.

Wales a Better Country

“Wales: A Better Country” (WAG, 2003) is the strategic agenda of WAG. The document sets out:

- WAG's guiding vision of a fairer, more prosperous, healthier and better educated country, rooted in our commitment to social justice and to putting health and wealth creation that is sustainable at the heart of policymaking;
- The agenda WAG has for public services in Wales, with a programme for delivering the manifesto commitments;
- The priority issues which are broader than any one section of government and where smarter working and working together can make a bigger and longer lasting impact;
- The way WAG wants to deliver jointly with partners in local government, business, the trade unions and the voluntary sector.

People Places Futures: The Wales Spatial Plan

The Planning and Compulsory Purchase Act 2004 (PCPA) is a key element for reducing delays within the planning system. The provisions introduce powers that allow for the reform and

speeding up of the planning system. The Act makes provision for WAG to prepare and publish a national spatial plan for Wales (the "Wales Spatial Plan") to which LPAs will be required to have regard when preparing their LDPs.

The Wales Spatial Plan (WSP, WAG 2004b) provides a strategic context for the development necessary to allow Wales to fulfil its ambitions for economic success, social inclusion and a quality environment. The purpose of the plan is to support and influence spatial policies and programmes of WAG and others. Plans to date include the Sustainable Development Schemes (SDS), PPW, the National Economic Development Strategy (NEDS) and Rural Development Plans (RDP). WSP reflects the planning policies set out in PPW. The key issues identified within WSP are carried through to the relevant local plans and the opportunities and conflicts between these plans with the other strategies have been reviewed within the Strategic Environmental Assessment (SEA).

Sustainable Development Action Plan 2004-2007

WAG is required by law to develop a scheme stating how it will promote sustainable development in the exercise of its functions. WAG's first scheme "Learning to Live Differently: The SDS was adopted in November 2000. In March 2004 WAG adopted a revised SDS: Starting to Live Differently. The Sustainable Development Action Plan (SDAP) 2004-2007 (WAG 2004c) presents how WAG will implement the commitments of this new scheme. This embeds a legal duty for sustainable development within activities, including sustainable procurement and minimising waste generation, energy, water and transport demands. A key objective, (No. 10) of the SEA, is that any flood risk management measures should seek to be sustainable, both in terms of maintenance requirements and in ensuring the reintroduction or continuation of natural processes.

Environment Strategy for Wales (Welsh Assembly Government, 2006).

This sets WAG's long-term (20 years) strategic direction for the environment of Wales. The Environment Strategy (ES) is supported by action plans and links directly with the SDP and WSP. This strategy directly references the environmental themes of biodiversity, landscape, climate change and flood risk management and supports the approach of managing the risks and consequences of flooding. This strategy will be reviewed by WAG and the action plan updated annually.

Planning Policy Wales - TAN15

TAN15 was produced in 2004 and therefore has no direct requirements or advice for SFCAs. However Section 10 of TAN15 provides guidelines on taking into account flood risks through the LDP and site allocation process.

The Justification Test

In order to assess the flood risks posed to a certain area or site, TAN15 operates a precautionary framework to ensure that development is either steered into the lowest flood risk area possible and undertake a justification test for any development that has to be located within a high risk flood zone. In order to define the various flood zones, TAN15 utilises development advice maps (DAMs), whereby flood zones are designated according to the flood risk posed to them, as outlined within **Table B 1**. The DAMs for the Blaenau Gwent LPA administrative area are shown in Figure 3 in Appendix A.

Table B 1: Flood Zone designations, their associated flood risk definition and use within the precautionary framework (TAN15, 2004)

Flood Zone	Definition	Use within the precautionary framework
A	Little or no risk of fluvial/ tidal flooding	Justification test is not applied and do not need to consider further
B	Areas known to have flooded historically. Evidenced by sedimentary deposits	Used as part of the precautionary approach to indicate where site levels should be checked against the extreme (0.1% annual probability) flood. No need to consider flood risks further if site levels are greater than the extreme flood level
C	Based on Environment Agency extreme flood outline (0.1% annual probability)	Indicates that flooding issues should be considered as an integral part of the decision making by the application of the justification test, including FCA
C1	Areas of the floodplain which are developed and served by significant infrastructure, including flood defences	Indicates that development can take place subject to the application of the justification test, including acceptability of consequences
C2	Areas of the floodplain without significant flood defence infrastructure	Indicates that only 'less vulnerable' development should be considered, subject to the application of the justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

As particular flooding consequences may not be acceptable for certain development types, the precautionary framework of TAN15 identifies the vulnerability of different land uses to flooding. Thus, development types have been sub-divided into three categories, as shown in **Table B 2**.

Table B 2: Development vulnerability classifications, as defined by TAN15 (TAN15, 2004)

Development Category	Types
Emergency Services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide shelter in times of flood
Highly vulnerable development	All residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centres), especially vulnerable industrial development, e.g. power stations, and waste disposal sites
Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites.

Whilst the overall aim of TAN15 is to locate development within the lowest flood risk areas, some existing and potential development sites would be located within higher risk areas such as Zone C. Therefore, some flexibility is necessary to enable the ongoing social and economic growth within Blaenau Gwent, whilst ensuring that the consequences of flooding are appropriately assessed and mitigated. Development can therefore only be located within Zones C1 (or C2 if it is a less vulnerable development) if it can be justified that:

- Its location in Zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; or;
- Its location in Zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region; and,
- It concurs with the aims of PPW and meets the definition of previously developed land and;
- The potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in Sections 5 and 7 and Appendix 1 of TAN15 and found to be acceptable (Planning Policy Wales, 2004).

Assessing Flood Consequences

Where development meets the test outlined in Section 4.2, it is justified in the knowledge that known flooding problems could occur, e.g. the development is located within Zone C, or in areas of Zone B where local conditions present known flooding problems. In these cases, an FCA would be required to ensure that the development remains safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the proposed development on flood risk generally; and,
- Minimal disruption to natural heritage (Planning Policy Wales, 2004).

Therefore, before deciding that whether a development can take place a site-specific FCA should be undertaken to examine the likely flood sources, the consequence to any receptors (e.g. development) of those floods and any potential mitigation that could reduce the risk of occurrence or the consequence of a flood event. An appropriate FCA should draw upon the generic guidance and information presented within this SFCA but can be tailored to suit the specific development site and local conditions that persist.

To assist in this process, TAN15 states that there are particular flooding consequences that may not be considered acceptable for particular types of development. For instance, in view of the traumatic impact of flooding on people's personal lives it is not sensible to allow residential development in areas that flood frequently. A frequency threshold of flooding below which flooding of development should not be allowed has been developed within TAN15 and provides indicative guidance for frequency threshold related to development (**Table B 3**).

Table B 3: Flood frequency guidance (Table A1.14 TAN15)

Type of Development	Threshold Frequency (Years)	
	Fluvial	Tidal
Residential	1%	0.5%
Commercial / Retail	1%	0.5%
Industrial	1%	0.5%
Emergency Services	0.1%	0.1%
General Infrastructure	1%	0.5%

Beyond the threshold frequency, proposed development would be expected to flood under extreme conditions. However, even with adequate mitigation measures TAN15 deems it “insensible” to allow particular development to take place where, for example, the velocity and depth of floodwaters was such that structural damage may be possible or that people could be swept away by the flood. Section A1.15 of TAN15 provides prescriptive, indicative guidance on what it considers tolerable conditions for different types of developments. This is outlined in **Table B 4**.

Table B 4: Tolerable conditions for different types of development (A1.15 TAN15)

Type of Development	Maximum depth of flooding (mm)	Maximum rate of rise of floodwaters (m/hr)	Maximum speed of inundation of flood risk area (hrs)	Maximum velocity (m/s)
	Property Access			Property Access
Residential (habitable rooms)	600	0.1	4	0.15
	600			0.3
Commercial and Retail	600	0.3	2	0.15
	600			0.3
Industrial	1000	0.3	2	0.3
	1000			0.45
Emergency Services	450	0.1	4	0.15
	600			0.3
General Infrastructure	600	0.3	2	0.3
	600			0.3

Blaenau Gwent Adopted Unitary Development Plan 2006 – 2011

Until it is eventually replaced by the emerging LDP, the Unitary Development Plan (UDP) remains the relevant planning policy document for Blaenau Gwent CBC. This document guides development within Blaenau Gwent until 2011. At present, policies contained within the UDP relevant to flood risk are:

- Policy PU4 – Surface water runoff: development which could increase the risk of flooding due to additional surface water run-off must include appropriate and environmentally sympathetic mitigation measures, defined by the council, in consultation with the Environment Agency Wales. Such measures including arrangements for the long term maintenance/replacement of any structures or other mitigation measures, must be provided by the developer to the satisfaction of the council prior to the development proceeding.

- Policy PU6 – Development and Flood Risk: Development (including the raising of land) which would result in an unacceptable risk of flooding, either on or off site, or which would adversely affect flood management or maintenance schemes, will not be permitted.

Blaenau Gwent Local Development Plan

Blaenau Gwent CBC is at the early stages of preparing a LDP that which will set out Blaenau Gwent CBC objectives and priorities for the development of Blaenau Gwent up to 2021. A list of 'Candidate Sites' has been provided, these are not currently land allocations, but are areas of potential significance that can aid Blaenau Gwent CBC in delivering their development requirements.

Appendix C – Historical Flooding in Blaenau Gwent

Table C 1 below provides some details of historical flood events within the administrative area of Blaenau Gwent CBC; the majority of this information is sourced from the Eastern Valleys CFMP (Environment Agency 2008) but has been supplemented by local knowledge from Blaenau Gwent CBC and the Environment Agency.

Table C 1: Historical flood events in Blaenau Gwent. Source: Eastern Valleys CFMP (Environment Agency 2008)

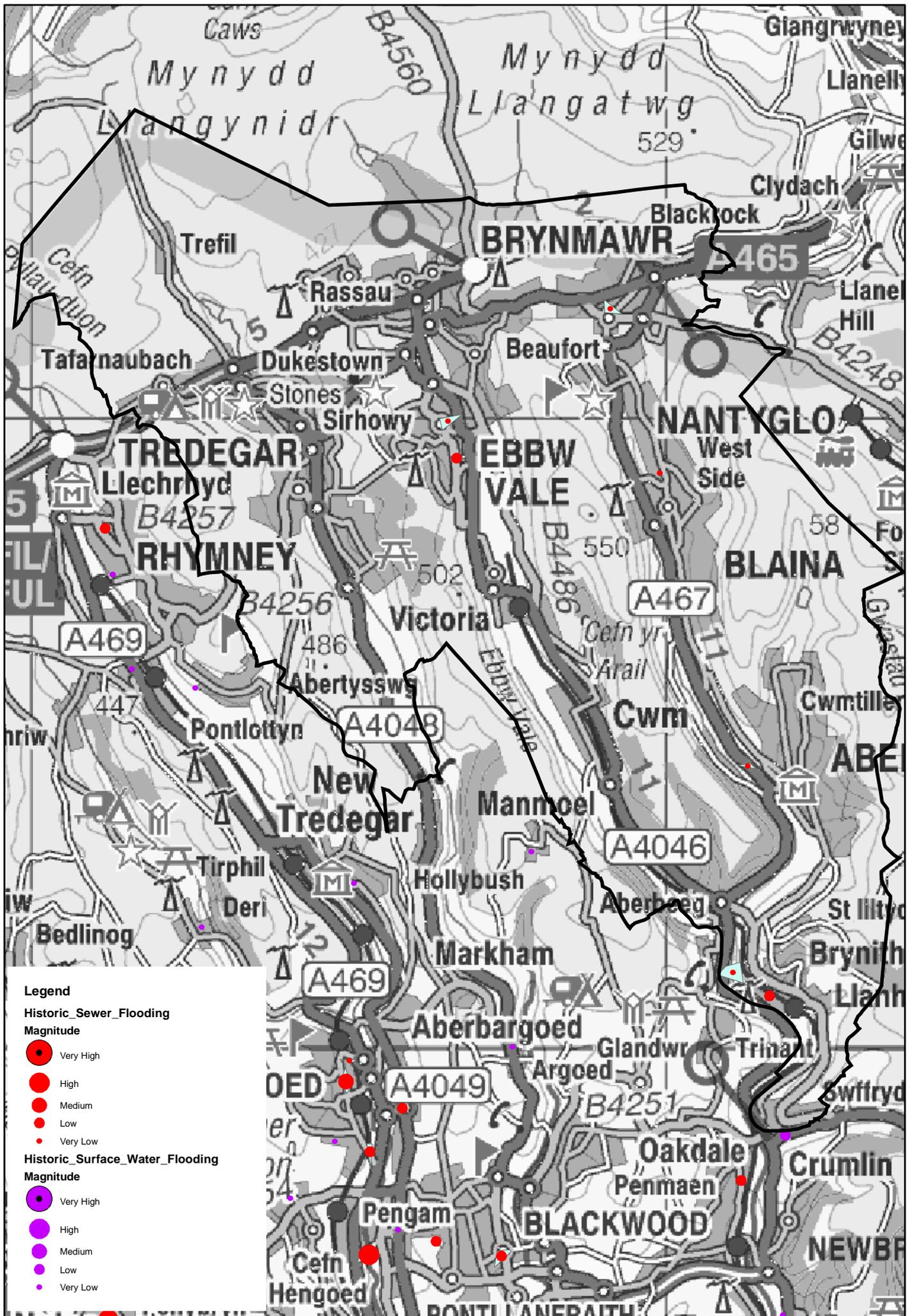
Year/ Month	Flood Source	Watercourse	Area(s) Affected	Details	Scale of Event
1607/Jan	Fluvial/Surface	Ebbw, Sirhowy	Most of South Wales	No specific information available	High
1768/Feb	Fluvial/Surface	Ebbw	Bassleg	Tredegar Park overflowed	Low
1772/Oct	Fluvial/Surface	Ebbw, Sirhowy	Most of South Wales	Properties flooded	Medium
1894/Nov	Fluvial/Surface	Ebbw	Tredegar to Newbridge	Infrastructure damage, properties flooded	Medium
1925/Jan	Fluvial/Surface	Ebbw	Cwm, Abertillery and Blaina	Duffryn School playground flooded in Cwm. Abertillery and Blaina collieries closed. Properties flooded	Low
1929/Nov	Fluvial/Surface	Ebbw	Cwm, Ebbw Vale, Aberbeeg	Water up to doors of houses in Oak Street, Cwm, Duffryn School yard flooded in Cwm, Aberbeeg recreation grounds flooded. Properties flooded.	Medium
1933/Oct	Fluvial/Surface	Ebbw	Area of Ebbw catchment	Culvert blocked at Gelli Crug causing houses at Six Bells to flood.	Medium
1998/Dec	Fluvial	Ebbw	Tredegar	32 properties flooded due to blockage in culvert	Medium

Table C2 below provides information relating to historical flood events of 1960 and 1979 in Blaenau Gwent, as provided by the Environment Agency.

Table C2. Information from the flood events in 1960 and 1979 in Blaenau Gwent

Date	Flood Source	Watercourse	Area(s) Affected	Approximate Water Level (mAOD)	Additional Notes
1979	Fluvial	Ebbw	Glandwr	146.39	
1979	Surface Water	Ebbw	Glandwr	147.23	
1979	Fluvial	Ebbw	Glandwr	168.06	
1979	Fluvial	Ebbw	Glandwr	n/a	
1979	Fluvial	Ebbw	Glandwr	n/a	Bank erosion noted
1979	Fluvial	Ebbw	Glandwr	n/a	Bank erosion noted
1979	Fluvial	Ebbw	Glandwr	157.96	
1979	Fluvial	Ebbw	Glandwr	154.92	
1979	Fluvial	Ebbw	Glandwr	154.32	
1979	Fluvial	Ebbw	Glandwr	n/a	
1979	Fluvial	Ebbw	Glandwr	159.1	
1979	Fluvial	Ebbw	Aberbeeg	159.52	
1979	Fluvial	Ebbw	Aberbeeg	158.43	
1979	Fluvial	Ebbw	Aberbeeg	190.27	
1979	Fluvial	Ebbw	Six Bells	179.03	No flooding occurred. High water caused by tree blocking a culvert
1979	Fluvial	Ebbw	Abertillery	196.17	
1979	Fluvial	Ebbw	Abertillery	196.69	
1979	Surface Water	Ebbw	Abertillery	n/a	
1979	Fluvial	Ebbw	Bournville	235.21	

Date	Flood Source	Watercourse	Area(s) Affected	Approximate Water Level (mAOD)	Additional Notes
1979	Fluvial	Ebbw	Bournville	n/a	Water level over topped concrete wall
1979	Fluvial	Ebbw	Bournville	233.38	Flood level over topped concrete wall
1979	Fluvial	Ebbw	Bornville	233.1	Flood level over topped concrete wall
1979	Fluvial	Ebbw	Blaina	256.88	
1979	Fluvial	Ebbw	Blaina	269.06	
1979	Fluvial	Ebbw	Nantyglo	306.42	
1979	Fluvial	Ebbw	Nantyglo	n/a	
1979	Fluvial	Ebbw	Bournville	237.74	
1960	Fluvial	Ebbw Fach	Aberbeeg footbridge (above confluence)	154.08	
1960	Fluvial	River Ebbw Fawr	Cwm	200.72	
1960	Fluvial	River Ebbw Fawr	Aberbeeg footbridge near confluence (upstream)	154.16	
1960	Fluvial	River Ebbw Fawr	Aberbeeg footbridge near confluence (downstream)	153.57	
1960	Fluvial	River Ebbw Fawr	Llanhilleth Colliery	139.17	
1960	Fluvial	River Sirhowy	Tredegar Gauge	298.96	



Appendix D – Flood Defence Information for Blaenau Gwent

Table D 1 below provides additional information relating to the formal flood defences within Blaenau Gwent, as provided by the Environment Agency

Table D 1 Additional flood defence information for Blaenau Gwent

Watercourse	Location	Standard of Protection	Structure	Notes
River Ebbw	Cwm	1 in 100 year	Embankments and reinforced walls	Reinforced walls are part EA maintained and part private
River Ebbw	Aberbeeg	1 in 100 year	Embankment, gabion basket walls and concrete walls	Embankment protects the left bank. Gabion basket protects Glandwr Street. Concrete wall protects Woodland Terrace
River Ebbw	Llanilleth	1 in 100 year	Concrete wall	Located parallel with Cae Felin Street and Meadow Street
Ebbw Fach	Abertilly	1 in 100 year	Embankment and concrete walls	Embankment protects Glandwr Street. Concrete wall protects Glandwr Street and Calyle Street
Ebbw Fach	Six Bells	1 in 100 year	Stone walls, embankment and concrete wall	Stone wall protects Arial Street. Embankment protects left bank up to Chapel Road Bridge

Appendix E – Gwent Flood Arrangements Information

Table E 1 below summarises the following roles and responsibilities, as identified by the Flood Arrangements report. Whilst this provides a summary of the various roles and responsibilities of various authorities, the list is not exhaustive and further information is available within the report itself or via the authorities involved.

Table E 1: Summary of roles and responsibilities during flood emergencies within Blaenau Gwent

Authorisation	Role/ Responsibility
Heddlu Gwent Police	Establish arrangements for co-ordination and liaison between organisations Assist in saving of life and property Co-ordinate arrangements for evacuation, if required
South Wales Fire and Rescue Service	Life saving through search and rescue Safety management within response zone Salvage and damage control Provision of specialist equipment
Welsh Ambulance Service/ NHS Trust	Provide a focal point at the incident Save lives, treat and care for injured persons Arrange, prioritise and determine evacuation or hospitalisation
British Transport Police	Support Heddlu Gwent Police at the co-ordination level Provide a secondary line of communication with the Railway Operators of an affected area.
Local Authorities (general)	Co-ordination of local authority response and their partners Emergency care for evacuees May provide emergency transport and equipment Management of flooded roads not in the jurisdiction of South Wales Trunk Roads Agency Information and liaison services with the media and relatives/ friends of evacuees
Blaenau Gwent County Council	On receipt of a Flood Watch, the LA would disseminate to relevant officers. Environment Directorate will check critical culverts and gullies, initiating necessary action On receipt of a Flood Warning, the Environment Directorate will continue with the above, alerting relevant officers On receipt of a Severe Flood Warning, further action taken. If the LA at Brynmawr receives complaints of flooding, a Flood Incident Room may be established. In the event that properties are flooded, limited pumping equipment is available which may be used at the LA's discretion If evacuation is recommended, transport and temporary accommodation will be provided to those who do not have friends and family to care for them
Environment Agency Wales	Issue flood warnings Maintain and operate vital flood alleviation schemes Monitor water levels and flows Check and undertake maintenance of flood alleviation schemes Support the joint agency response Provide materials, equipment and manpower
Dwr Cymru Welsh Water	Repair damaged assets affected by flood event Provide alternative water supplies if necessary