



FLOOD RISK REGULATIONS 2009

PRELIMINARY FLOOD RISK ASSESSMENT REPORT



Drybridge Street, Monmouth, Flooding in February 2002.

Document Control Sheet

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Revision History

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May 2011	1	Draft
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Approvals

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Distribution

Name	Title	Date	Version

Preliminary Assessment Report

Executive Summary

Under the Flood Risk Regulations 2009, Monmouthshire County Council, as the Lead Local Flood Authority (LLFA), is required to identify those areas in the county at risk of flooding with significant consequences –Flood Risk Areas. These are areas or clusters of areas above the flood risk threshold with an affected population greater than 5,000 people at risk.

No clusters have been identified in Monmouthshire either from the Environment Agency nor from the local data as no areas have an affected population of more than 5,000 people and hence are not considered flood risk areas under the Regulations.

No further immediate action is therefore required under the Flood Risk Regulations.

However there are other areas identified as being at flood risk below the threshold, these will form the basis of local flood risk management strategies, supported by the continuing collection of information on local flood events.

Preliminary Assessment Report

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Annexes

- Annex 1 Record of past floods
- Annex 2 Future floods
- Annex 3 Flood Risk Areas (Not Required)
- Annex 4 Review checklist

1. Introduction

Preliminary Flood Risk Assessment

- 1.1 The Flood Risk Regulations 2009, transposes into domestic law the provisions of the European Commission Floods Directive (Directive 2007/60/EC) on the assessment and management of flood risk across European Union Member States. The overall aim of the Regulations is to reduce the likelihood and consequence of flooding.
- 1.2 Part 2 of the Regulations sets out a four stage process to identify, assess and manage flood risk (see Table 1.1). Under the Regulations, and in line with responsibilities under the Flood and Water Management Act (2010), Lead Local Flood Authorities (LLFA's) are initially responsible for undertaking a Preliminary Flood Risk Assessment (PFRA) to satisfy the requirements of Stages 1 and 2.

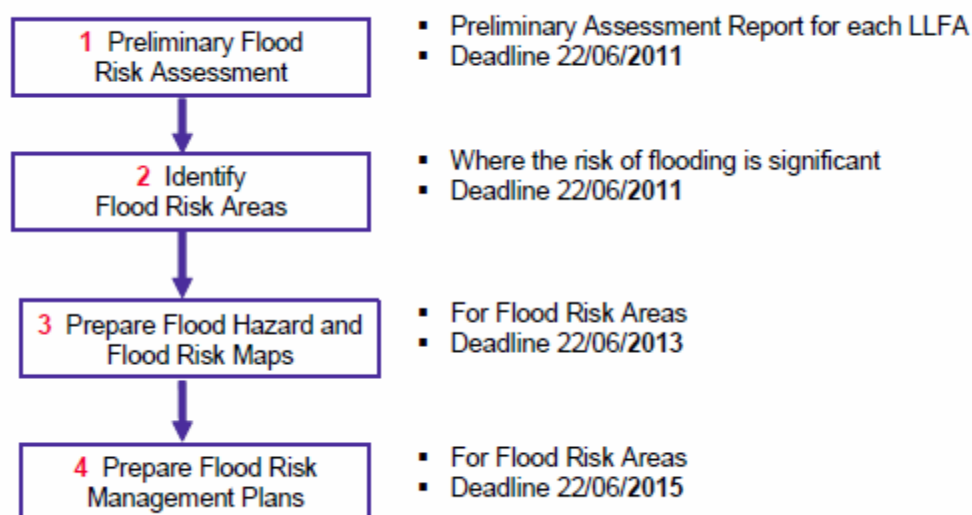


Table 1.1: Stages of the Flood Risk Regulations

- 1.3 The PFRA is a high level screening exercise which involves collecting existing and available information on past (historic) and future (potential) floods, assembling it into a preliminary assessment report, and using it to identify Flood Risk Areas where the risk of flooding is significant.

Aims and Objectives

- 1.4 The primary objective of this Preliminary Flood Risk Assessment Report is to consider and identify local Flood Risk Areas in Monmouthshire. This information will then inform the latter stages of the four stage process set out in Table 1.1. The report will also inform and support the local flood risk management strategy that is required to be produced under the Flood and Water Management Act 2010.
- 1.5 The Report provides an assessment of potential flood risks for which Monmouthshire County Council, as Lead Local Flood Authority, has responsibility. These include the risk of flooding from surface water, groundwater, ordinary watercourses, canals and small reservoirs. It does not

consider flooding from main rivers, the sea or large raised reservoirs, except where these impact on other sources of flooding.

Study Area

- 1.6 The study area is the administrative boundary of Monmouthshire County Council which is a unitary authority in South East Wales with a population of approximately 86,000 and an area of 880 square kilometres.
- 1.7 The area comprises a number of main towns including Abergavenny, Monmouth, Chepstow, Caldicot, Magor with Undy, Usk and Raglan. The remainder of the County is predominately rural. The local economy is largely reliant on tourism and farming with many people travelling to Cardiff and Newport for employment

2. Lead Local Flood Authority responsibilities

- 2.1 In his Review of the summer 2007 flooding, Sir Michael Pitt stated that “the role of local authorities should be enhanced so that they take on responsibility for leading the coordination of flood risk management in their areas”. As a LLFA, Monmouthshire County Council is therefore responsible for leading local flood risk management across the county of Monmouthshire.
- 2.2 Much of the local knowledge and technical expertise necessary for Monmouthshire County Council to fulfil their duties as LLFA lies with partner organisations. It is therefore crucial that the County Council works alongside these groups and organisations to ensure effective and consistent management of local flood risk. As Lead Local Flood Authority in the preparation of this report, it is the role of Monmouthshire County Council to forge effective partnerships with Environment Agency Wales, Dŵr Cymru/Welsh Water, Caldicot & Wentlooge Internal Drainage Board, British Waterways Board and Monmouthshire’s Council’s highways department, who also act as Trunk Road agents for Welsh Assembly Government.
- 2.3 This document and annexes were placed before the Strong Communities Select Committee of Monmouthshire County Council on the 26th May 2011, for approval. Amendments sought by that Committee have been incorporated into this final document.

3. Methodology and data review

- 3.1 The Environment Agency has provided details of areas of the Ordnance Survey National Grid of 1 km square considered above the flood risk threshold. These areas were checked against information held by Monmouthshire Council and information provided by other agencies as detailed below.
- 3.2 Monmouthshire County Council holds asset information, on Monmaps, the Council’s GIS and mapping system, provided by Welsh Water (DCWW), Caldicot & Wentlooge Internal Drainage Board (C&WIDB), Lower Wye Internal Drainage Board and British Waterways Board (BWB). Details of past flood events of local significance are also available.

3.3 The Environment Agency has provided:

- Flood Map for Surface Water showing areas which could flood from surface water in storms with a 1 in 30 chance and 1 in 200 chance of occurring in any year.
- Areas Susceptible to Surface Water Flooding.
- Flood Map showing the extent of flooding from rivers with a catchment of more than 3 km² with a 1 in 100 and 1 in 1000 chance of occurring in any year
- Flood mapping showing the 1 in 200 flood risk areas of flooding to 0.1metres and 0.3 metres depth
- National Receptor Dataset providing information on social, economic, cultural and environmental receptors.

3.4 Dŵr Cymru Welsh Water have provided details of past incidents of sewer surcharging from surface water and will provide details of future incidents to inform the review process.

3.5 Caldicot & Wentlooge Internal Drainage Board have provided details of all their assets in Monmouthshire and this has been added to our database.

3.6 Information collated by Monmouthshire County Council for this report is held either on Monmaps or on an electronic filing system.

4. Past flood risk

4.1 Monmouthshire County Council holds some records of past flooding incidents and requests for sandbags relating to flood risks. The quality of these varies with some very good data from studies to poor with little background data, particularly the requests for sandbags. These have been collated and assessed in the light of “significant harmful consequences”, as determined by the Welsh Assembly Government Minister, and for local significance. For the purpose of this report, a locally significant historic event is defined as one where 5 or more residential properties are flooded. Where works have been undertaken to alleviate flooding problems or where an incident does not meet the criteria of significance, that particular incident does not form part of this Report. However, details of the incident are maintained on the database and will be re-assessed should further flooding incidents occur at that site.

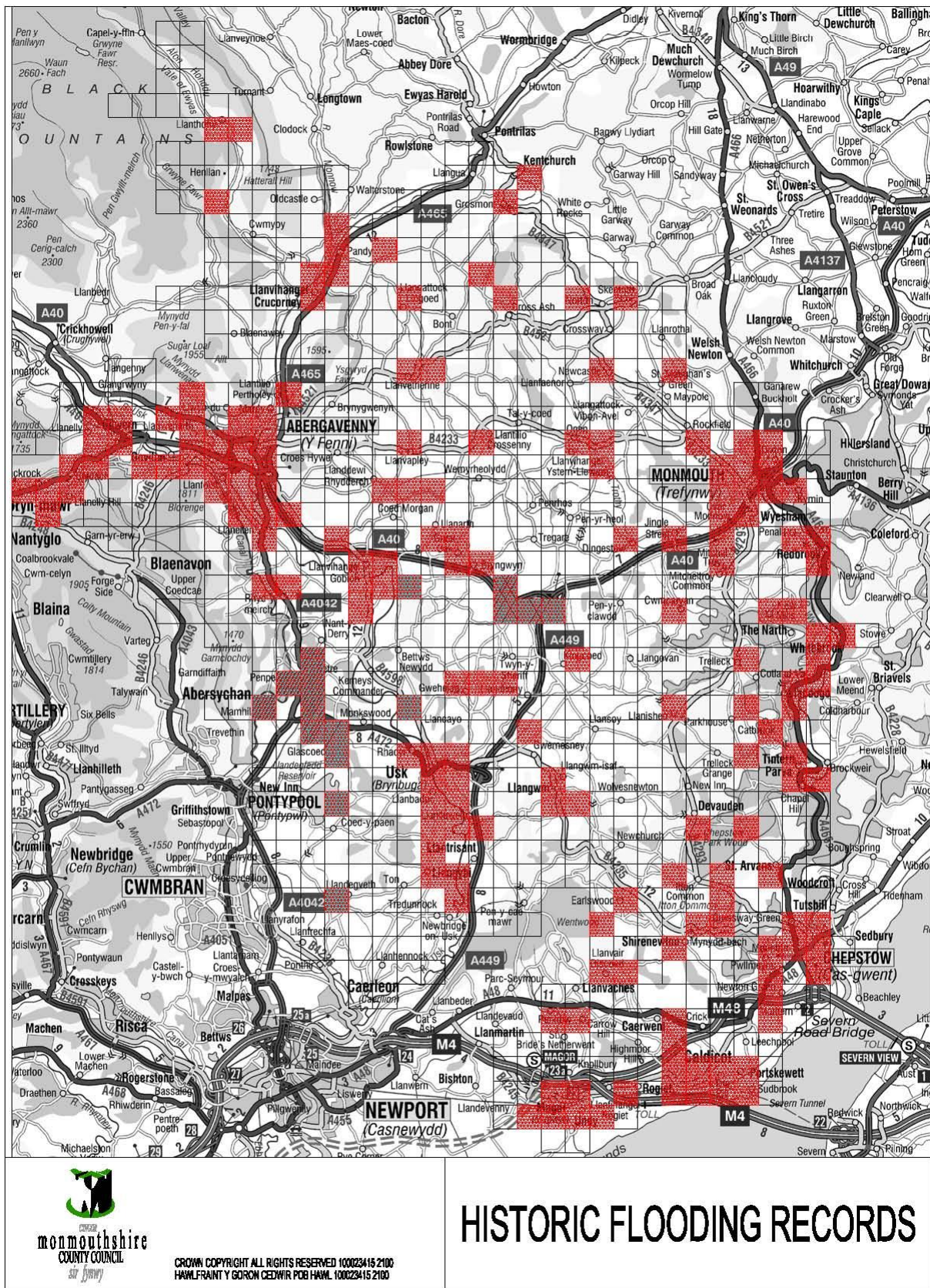
4.2 Data is available on past floods, for surface water/river flooding provided by Monmouthshire County Council and for sewer surcharging provided by Dŵr Cymru Welsh Water. Map 4.1 shows the location of **all** past flooding recorded by OS grid square with **significant** past floods (those affecting 5 or more households) shown **green** and detailed in Table 4.1.

4.3 Those locations considered by Monmouthshire County Council to remain at risk of further flooding are detailed in Table 5.1 and Map 5.2 and Annexe 1.

TABLE 4.1 - Summary of past flooding by Kilometre Square

OS Grid	Grid Square	Location & Detail	No of Households Flooded
SO	5200 & 5300	Raglan Road, Angiddy Valley and properties at A466 area. Floods from upstream culverts that are capacity constrained. In addition Pont Y Saeson Dam blocked and overflowed. Flooded in 1993, 2001, 2002, 2003.	16
SO	5112 & 5212	Blake Street area, Wyesham, Monmouth. Surface water run off from Kymin floods houses. Culvert capacity issues. 31 Sandbag requests recorded	12
SO	5310	Road R77 Upper Ferry Rd Redbrook. Flooding from culverted watercourse	8
SO	3321 & 3322	Wern Gifford. Roads R1, C2.1, C4.8 flood also water course at Pandy Inn floods in heavy storms. Also Lancaster Arms & 'Brynafel' and Brooklyn Cottage flood from river. Pandy caravan park also floods.	7
SO	2313	Major landslip caused at Blackrock road from blocked culvert on watercourse. Houses flooded, road flooded and major repair works. Culvert is on Cwm Sion Matthew crossing under Church Rd.	6
SO	5115	Buckholt Heavy storms in Oct 2008 caused flooding of brook and washed away road as well as flooding 12 properties	6
SO	4107	Barton Bridge Close, Raglan. Houses flood from local watercourse, partly due to encroachment into watercourse.	5
ST	4988	Hollybush Close, Main Rd & Tree Tops Portskewett. Road flooding and property flooding from surface water run off. 8 sandbag requests	5
SO	5001	Pont y Saeson Dam / Furnace Dam, blocks and overflows down Angiddy Valley. Part cause of 1993 floods in Tintern. Road R94 Fountain Inn floods from culvert	5
SO	4200 & 4299	Llangwm. Capacity constraints in culverts on Nant Y March and Dyffryn Brooks cause flooding to properties. 6 sandbag requests	4-5

Map 4.1 – Historic Surface Water Flooding
Map of Monmouthshire with OS Squares highlighted for All Past Floods



5. Future flood risk

Locally Agreed Surface Water Information

- 5.1 No strategic studies have been undertaken to specifically assess the flood risk from surface water in Monmouthshire. However, EAW has produced a national assessment of surface water flood risk in the form of two national mapping datasets. The first generation national mapping, Areas Susceptible to Surface Water Flooding (AStSWF) contains three susceptibility thresholds for a rainfall event that has a 0.5% annual probability of occurrence. The national methodology has since been updated to produce the Flood Map for Surface Water (FMfSW), a revised model with two flood events (3.33% and 0.5% annual probabilities) and two depth thresholds (greater than 0.1m and greater than 0.3m deep). The 0.5% event and 0.3m deep threshold has been used by the EA to produce indicative Flood Risk Areas and adopted by the LLFA to identify properties and critical services at future risk of surface water flooding.

As no local information has been produced the FMfSW national dataset forms the locally agreed surface water information. The AStSWF dataset was not adopted as it was viewed to be less accurate, as the estimates of surface water flows did not consider infiltration and the effects of sewers. In addition the FMfSW dataset takes into account buildings which were not represented in the AStSWF dataset.

The locally agreed surface water information is shown in Map 5.2 and illustrates areas that are predicted to flood to a depth greater than 300mm associated with a 0.5% annual probability rainfall event.

Local Drainage Capacity

- 5.2 Monmouthshire has both separate and combined foul and surface drainage systems. No specific information has been obtained on the capacity of highway drainage within the area. In addition, although DCWW historical flood records are given a risk category based on a prescribed methodology (a combination of frequency of flooding and storm return periods), no specific information has been obtained on the capacity of sewer systems within Monmouthshire. In line with national design standards and information on past floods in Monmouthshire, the capacity (surcharged conditions) of highway drainage networks and sewers is likely to be exceeded in rainfall events with an annual probability in the order of 3.33%. Local drainage capacity, where designed, has been designed to accommodate a 1 in 5 to 1 in 30 storm event. However, there are very old brick and stone culverts in some areas still providing service.

Groundwater

- 5.3 It is understood that there is no local information on future groundwater flooding for Monmouthshire. The risk of groundwater flooding is considered to be low, and it is not considered to be a significant issue within the catchment.

Other Sources of Flooding

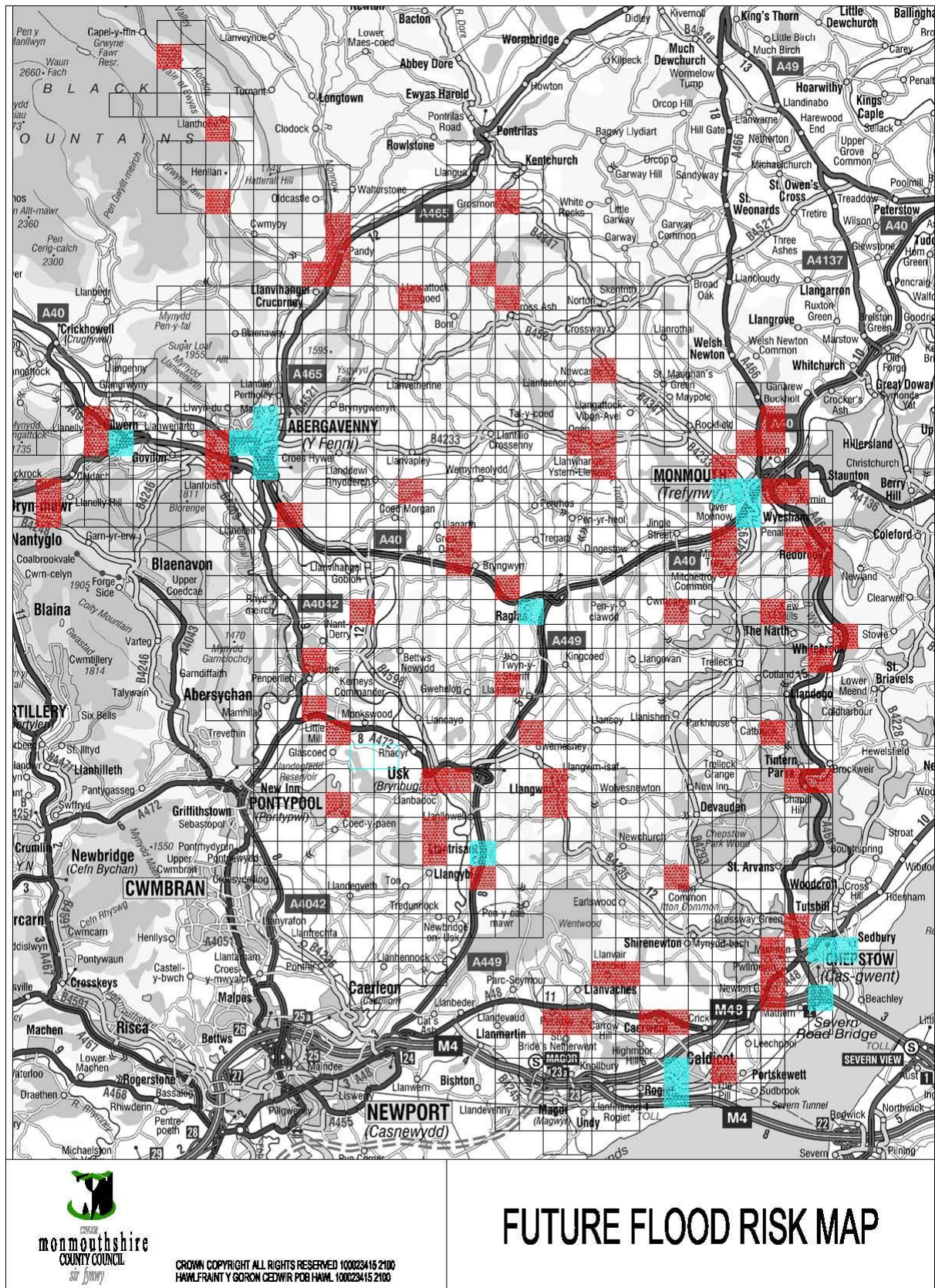
- 5.4 No local information on other sources of future flooding has been obtained for the area.

- 5.5 This information is considered to be the best available information to detail those areas in the County of Monmouthshire to be at a locally significant risk of flooding in the future. The criteria for locally significant risk is set as for historic flooding at 5 households or more. It must also be emphasised that flooding from ordinary watercourse and surface water flow will not necessarily be confined to these areas – flooding may occur almost anywhere. Table 5.1 and Annexe 2 lists sites with future flood risk based mainly on past events where flooding is likely to occur again or comparable sites where flooding has not yet occurred but is likely.

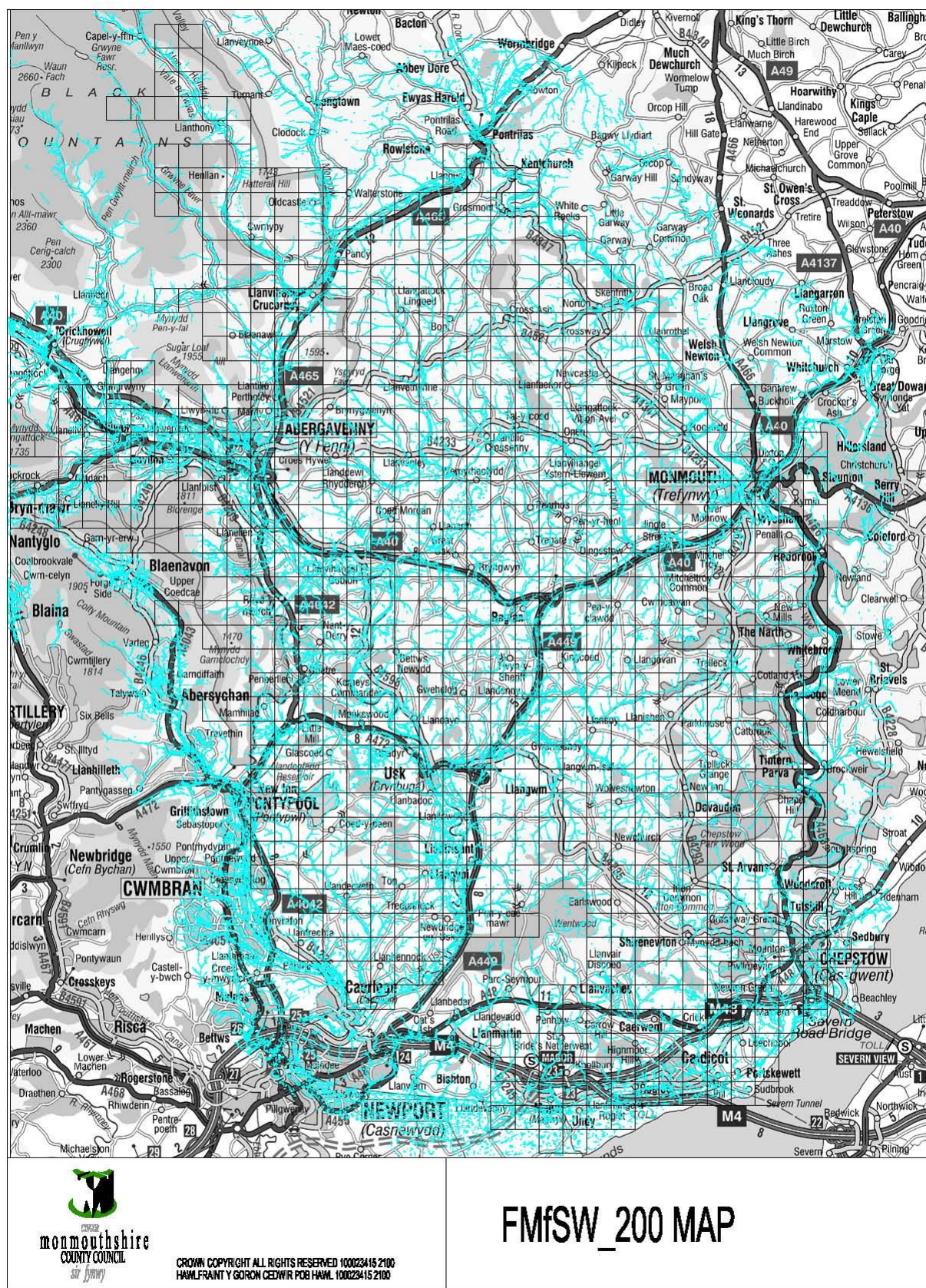
Table 5.1 Future Flood Risk Sites of Significance

Grid Square	OS Square No	Location & Details	Properties at Risk of Flooding
SO	5112 & 5212	Blake Street area, Wyesham, Monmouth. Surface water run off from Kymin floods houses. Culvert capacity issues. Scheme approved by WAG for detailed design.	12
SO	2315	Canal Breach Gilwern. Assessment of effect of a future breach	10
SO	2813	Canal Collapse, Llanfoist. Assessment of effect of a future breach in this area	10
SO	4107	Barton Bridge Close, Raglan. Houses flood from local watercourse, partly due to encroachment into watercourse. Subject of a Pre Feasibility Study	8 to 10
SO	3321 & 3322	Wern Gifford. Roads R1, C2.1, C4.8 flood also water course at Pandy Inn floods in heavy storms. Also Lancaster Arms & 'Brynafel flood from river. Subject of bid for WAG funding in 2009.	8
SO	4200 & 4299	Llangwm. Capacity constraints in culverts on Nant Y March and Dyffryn Brooks. PAR submitted to WAG in 2009	8
SO	4913	Kingswood Road, St Vincents Drive, Rockfield Estate, Monmouth. Floods from surface water. Subject of a WAG bid in 2009	7
SO	5200 & 5300	Raglan Road, Angiddy Valley and properties at A466 area. Floods from upstream culverts that are capacity constrained. In addition Pont Y Saeson Dam could fail in extreme flood adding to flows in Angiddy valley Tintern. Subject of a Pre Feasibility Study and a PAR for part of the area	7 plus
SO	5115	Buckholt. Brook floods after heavy rainfall and floods properties. Subject of a WAG bid in 2009	6

**Map 5.1 Sites of Future Flood Risk of Local Significance.
Includes Areas above the Threshold identified by Environment Agency**



**Map 5.2: Flood Map for Surface Water
1 in 200 Year Rainfall, Flood Depths to 0.1m and 0.3m.**



The impacts of climate change

5.6 The Evidence

There is clear scientific evidence that global climate change is happening now. It cannot be ignored. Over the past century around the UK we have seen sea level rise and more of our winter rain falling in intense wet spells. Seasonal rainfall is highly variable. It seems to have decreased in summer and increased in winter, although winter amounts changed little in the last 50 years. Some of the changes might reflect natural variation, however the broad trends are in line with projections from climate models.

Greenhouse gas (GHG) levels in the atmosphere are likely to cause higher winter rainfall in future. Past GHG emissions mean some climate change is inevitable in the next 20-30 years. Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080s.

We have enough confidence in large scale climate models to say that we must plan for change. There is more uncertainty at a local scale but model results can still help us plan to adapt. For example we understand rain storms may become more intense, even if we can't be sure about exactly where or when. By the 2080s, the latest UK climate projections (UKCP09) are that there could be around three times as many days in winter with heavy rainfall (defined as more than 25mm in a day). It is plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance, or rarer) could increase locally by 40%.

5.7 Key Projections for Severn River Basin District

If emissions follow a medium future scenario, UKCP09 projected changes by the 2050s relative to the recent past are

- Winter precipitation increases of around 12% (very likely to be between 2 and 26%)
- Precipitation on the wettest day in winter up by around 9% (very unlikely to be more than 22%)
- Relative sea level at Bristol very likely to be up between 10 and 40cm from 1990 levels (not including extra potential rises from polar ice sheet loss)
- Peak river flows in a typical catchment likely to increase between 9 and 18%
- Increases in rain are projected to be greater at the coast and in the south of the district.

5.8 Implications for Flood Risk

Climate changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability.

Wetter winters and more of this rain falling in wet spells may increase river flooding along the Severn and its tributaries. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for the unexpected.

Drainage systems in the district have been modified to manage water levels and could help in adapting locally to some impacts of future climate on flooding, but

may also need to be managed differently. Rising sea or river levels may also increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses.

Where appropriate, we need local studies to understand climate impacts in detail, including effects from other factors like land use. Sustainable development and drainage will help us adapt to climate change and manage the risk of damaging floods in future.

5.9 Adapting to Change

Past emission means some climate change is inevitable. It is essential we respond by planning ahead. We can prepare by understanding our current and future vulnerability to flooding, developing plans for increased resilience and building the capacity to adapt. Regular review and adherence to these plans is key to achieving long-term, sustainable benefits.

Although the broad climate change picture is clear, we have to make local decisions against deeper uncertainty. We will therefore consider a range of measures and retain flexibility to adapt. This approach, embodied within flood risk appraisal guidance, will help to ensure that we do not increase our vulnerability to flooding.

5.10 Long Term Developments

It is possible that long term developments might affect the occurrence and significance of flooding. However current planning policy aims to prevent new development from increasing flood risk.

In Wales, Technical Advice Note 15 (TAN15) on development and flood risk sets out a precautionary framework to guide planning decisions. The overarching aim of the precautionary framework is "to direct new development away from those areas which are at high risk of flooding."

Adherence to Government policy ensures that new development does not increase local flood risk. However, in exceptional circumstances the Local Planning Authority may accept that flood risk can be increased contrary to Government policy, usually because of the wider benefits of a new or proposed major development. Any exceptions would not be expected to increase risk to levels which are "significant" (in terms of the Government's criteria).

5.11 Appraisal guidance

Current project appraisal guidance (Defra, 2006) provides indicative sensitivity ranges for peak rainfall intensity, for use on small catchments and urban/local drainage sites. These are due to be updated following the UKCP09 projections above. They describe the following changes in peak rainfall intensity; +5% (1990-2025), +10% (2025-2055), +20% (2055-2085) and +30% (2085-2115). This was reviewed by the Met Office in 2008 using UKCP09 models (Brown et al., 2008). They suggest that, on the basis of our current understanding, these levels represent a pragmatic but not a precautionary response to uncertainty in future climate impacts. In particular for a 1 in 5 year event, increase in precipitation intensity of 40% or more by the 2080s are plausible across the UK at the local scale.

6. Review of indicative Flood Risk Areas

- 6.1 There are no Indicative Flood Risk Areas identified within Monmouthshire. The Environment Agency has identified a number of areas that were above the threshold for the assessment process. These are at Gilwern, Abergavenny, Monmouth, Raglan, Glascoed, Llantrisant, Chepstow, and Caldicot. The criteria that was set for these was: a flooding depth of 0.3m to more than 200 persons, more than 1 critical service or 20 commercial properties. These were building blocks to identify clusters or areas that exceeded the 5000 person threshold to identify the Indicative Flood Risk Areas across Wales.

7. Identification of Flood Risk Areas

- 7.1 None of the information collected on past floods or arising from assessments of future floods leads to identifying any additional indicative Flood Risk Areas in Monmouthshire.

8. Next steps

- 8.1 Review of the information contained in this report is required to be undertaken by 22nd June 2011 and every six years thereafter.
- 8.2 **Environment Agency Flood Mapping**
The list of receptors within the EA flood outline will be amended as the EA update their flood mapping and will inform the review of any flood risk management strategies undertaken as a consequence of this report. Any changes will be notified to the relevant Partner.
- 8.3 **Flood Mitigation Measures**
As notification of mitigation measures undertaken to alleviate the probability of flooding are received, amendments to the assets at risk mapping will be made and will inform the review of the Flood Risk Areas, places above the flood risk threshold and management strategies.
- 8.4 **Reported flooding incidents**
Over time, information on flooding incidents will accumulate and be added to the database. This will provide a picture of the location of incidents. Where there are a number of flooding reports in one area, depending on the severity of the perceived consequences, it may be necessary to review the list of places above the flood risk threshold and possibly amend the list of Flood Risk Areas.

9. References

Flood and Water Management Act 2010

<http://www.legislation.gov.uk/ukpga/2010/29/contents/>

The Flood Risk Regulations 2009

<http://www.legislation.gov.uk/uksi/2009/3042/contents/made>

Preliminary Flood Risk Assessment (PFRA)

Final Guidance

Report – GEH01210BTGH-E-E

Environment Agency

<http://publications.environment-agency.gov.uk/>

Preliminary Flood Risk Assessment (PFRA)

Annexes to the final guidance

Report – GEH01210BTHF-E-E

Environment Agency

<http://publications.environment-agency.gov.uk/>

Selecting and Reviewing Flood Risk Areas for local sources of flooding

Guidance to Lead Local Flood Authorities

Flood Risk Regulations 2009

DEFRA / Welsh Assembly Government

<http://ww2.defra.gov.uk/environment/flooding/>

United Kingdom Climate Projections 2009 (UKCP09)

<http://ukclimateprojections.defra.gov.uk/>

Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Avery, M. Tignor and H.L. Miller (eds.). Summary for Policymakers. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 9. Available for download from

<http://www.ipcc.ch/ipccreports/ar4-wg1.htm>

SJ Brown, M Beswick, E Buonomo, R Clark, D Fereday, D Hollis, RG Jones, EJ Kennett, M Perry, J Prior and AA Scaife. Met Office Submission to the Pitt Review – Executive Summary, The extreme rainfall of Summer 2007 and future extreme rainfall in a changing climate. 08/01/2008

Defra (2006) Flood and Coastal Defence Appraisal Guidance, FCDPAG3 Economic Appraisal, Supplementary Note to Operating Authorities – Climate Change Impacts October 2006.

<http://www.defra.gov.uk/environment/flooding/documents/policy/guidance/fcdpag/fcd3climate.pdf>