Preliminary Flood Risk Assessment

Prepared to meet the Vale of Glamorgan Council's duties to manage local flood risk under the Flood Risk Regulations (2009)

Preliminary Flood Risk Assessment Report

Executive Summary

The EC Floods Directive has been transposed into UK law through the Flood Risk Regulations (2009) and the Flood and Water Management Act (FWMA). Under the Flood Risk Regulations (2009, the Vale of Glamorgan Council must prepare and under a Preliminary Flood Risk Assessment (PFRA) to assess harmful consequences of past and potential future floods and to identify significant flood risk areas.

The Vale of Glamorgan Council is defined as a Lead Local Flood Authority (LLFA) in accordance with the Flood and Water Management Act 2010. This report has been prepared to meet the Vale of Glamorgan Council's duties to manage local flood risk and deliver the requirements of the Flood Risk Regulations (2009). This report has been compiled to fulfil the requirements of the first stage in the PFRA process and comprises this document, supporting spreadsheets and GIS Layers.

The PFRA process aims to provide a high level overview of flood risk from local flood sources, including surface water, groundwater, ordinary watercourses, canals and lakes. The Environment Agency (EA) is responsible for preparing deliverables of the Flood Risk Regulations for Main River and the sea. The Council is required to submit the PFRA to the Environment Agency Wales (EAW) for review by the 22nd June 2011. The methodology for producing this PFRA is based on the Environment Agency's PFRA Guidance and Defra's/WAG's Guidance to Lead Local Flood Authorities on selecting and reviewing Flood Risk Areas for local sources of flooding.

Using the criteria set down by Defra/WAG of a threshold of 5,000 people, no Flood Risk Areas are identified within the Vale of Glamorgan. The Flood Risk Area identified covering Cardiff did impact on areas of the Vale but following consultation with the EA and the City and County of Cardiff Council the Flood Risk Areas boundary has been amended slightly to reflect the relevant administrative boundaries.

Areas identified as being at risk of flooding, but not being identified as being above the flood risk threshold, will form the basis of the local flood risk strategy, supported by the continued collection of information on local flood events and flood risks.

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Contents

1 Introduction

1.1 Vale of Glamorgan PFRA

1.1.1 The Vale of Glamorgan Council is responsible for producing a Preliminary Flood Risk Assessment for their administrative area.

The main drivers behind this report are from recent legislation which are:

- Flood Risk Regulations 2009 and
- Flood and Water Management Act 2010 (FWMA).

Under these pieces of legislation, all Unitary Authorities within Wales are designated Lead Local Flood Authorities (LLFA) and have been formally allocated a number of key responsibilities with respect to local flood risk management.

The purpose of the Flood Risk Regulations 2009 is to transpose the EC Floods Directive (Directive 2007/60/EC on the assessment and management of flood risks) into domestic law in England and Wales and to implement its provisions. In particular, it places duties on the Environment Agency and LLFAs to prepare, where required, a number of documents including:

- Preliminary Assessment Report
- Flood Hazard and flood risk maps and
- Flood Risk Management Plans.

The duties of the LLFA with regard to this report are provided in Part 2 (Section 10) of the Flood Risk Regulations 2009 and are as follows:

Duty to prepare preliminary assessment reports: Lead Local Flood Authority

10. (1) A lead local flood authority must prepare a preliminary assessment report in relation to flooding in its area.

(2) A lead local authority is not required to include in its report information about flooding from a source mentioned in regulation 9(1)(b) unless the authority thinks that it may affect flooding from another source.

(3) The Environment Agency –

(a) must review a preliminary assessment report prepared under this regulations, and

(b) may recommend modifications.

(4) Following a review, a lead local flood authority may revise its preliminary assessment report.

(5) The Agency's power to require information under regulations 36 includes powers to require a lead local flood authority to provide a preliminary assessment report by a specified date.

(6) This regulation is subject to regulations 33 and 34.

Table 1 shows the elements of work required from the Vale of Glamorgan Council under the Flood Risk Regulations 2009, along with timescales of their respective delivery. The first two elements of work that are highlighted in red are covered by this preliminary assessment report.

Table 1: Elements of work required under the Flood Risk Regulations 2009

22 June 2011	**Prepare Preliminary Assessment Reports**	*The PFRA should focus on local flood risk from surface water, groundwater, ordinary watercourses, canals and small impounded reservoirs*
22 June 2011	On the basis of the PFRA, identify **Flood Risk Areas**	*Flood Risk Areas are areas of significant risk, identified on the basis of the findings of the PFRA, national criteria set by UK Government Secretary of State and guidance provided by the Environment Agency.*
22 June 2013	Prepare **Hazard Maps** and **Risk Maps** for each Flood Risk Area	*Used to identify the level of hazard and risk of flooding within each Flood Risk Area to inform Flood Risk Management Plans*
22 June 2015	Prepare **Flood Risk Management Plans**	*Plans setting out risk management objectives and strategies for each of the Flood Risk Areas.*

It is noted that the scope of a PFRA for LLFAs is to consider past flooding and possible future flooding from the following local sources:

- Surface water
- Groundwater

- Ordinary watercourses and
- Flooding from canals and small impounded reservoirs

It is also noted that the PFRA must consider floods which have significant harmful consequences for human heath, economic activity and the environment. Flooding associated with the sea, main rivers and reservoirs is the responsibility of the Environment Agency and doe not need to be considered by the LLFA unless it is considered that it may affect flooding from one of the sources above.

1.2 Aims

1.2.1 To provide an assessment and description of past floods and the possible consequences of future floods. It will also present a review of the default Flood Risk Areas provided by the Environment Agency. The report will be working within the framework Flood Risk Regulations 2009, which implement the requirements of the European Floods Directive, and the criteria for significant flood risk as identified by the Welsh Assembly Government and DEFRA.

1.3 Objectives

1.3.1 This document will achieve the aim outlined by:

- Assess past floods from local sources, including surface water, groundwater and ordinary watercourses
- Assess possible harmful consequences of future floods from local sources.
- Prepare systems for data collection and sharing.
- Prepare methods of data management and maintenance.
- Define relevant authorities and partner agencies.
- Define the methods of partnership engagement.
- Review default Flood Risk Areas
- Define the proposed Flood Risk Areas

1.4 Geographic Extent

1.4.1 This document is specific to the area covered by the Vale of Glamorgan Unitary Authority; See Fig 1. The Vale of Glamorgan administrative area covers an area of 335km^2 and is located on the South Wales coast. Bordered by Bridgend to the North West, Rhondda Cynon Taf to the north, Cardiff to the north east, and the Bristol Channel to the south Its Principal towns include Barry, Cowbridge, Llantwit Major, Penarth and Rhoose. The Vale of Glamorgan is mainly within the Western Wales River

Basin District but there is also a section of the Ely River catchment, within the Severn River Basin District.

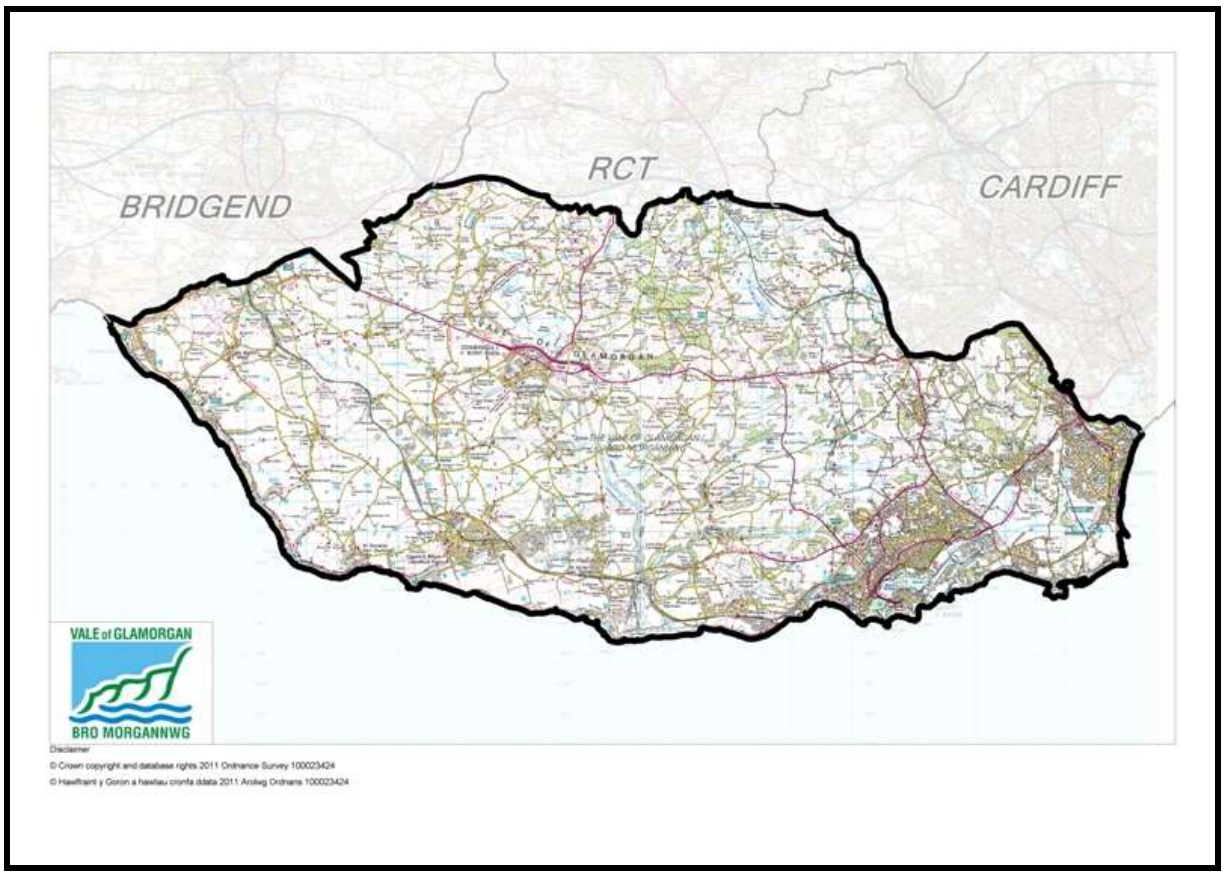

Figure 1: Vale of Glamorgan Geographic Extent

1.5 Flood Sources

1.5.1 This report considers the flood risk from Non-main River, surface water, groundwater and sewer flooding. Main River and Tidal flooding is also considered, but only in the context of their interactions with above flood risks.

1.5.2 Flood risk from main rivers, the sea or large reservoirs is not considered as this is the responsibility of the EA

2 Lead Local Flood Authority Responsibilities

2.1 Approach

2.1.1 The overall approach to producing the Preliminary Assessment Reports was via a Task & Finish group, set up under multi agency Vale of Glamorgan Council Flood Forum. The core members of the group are representatives from

- Highways and Engineering
- Planning and Transportation Services
- Civil Protection Unit
- ICT

2.1.2 The decision to establish the group, and the choice of its core members, was to create a coherent structure to drive forward the project.

2.1.3 Using the Vale of Glamorgan Flood Forum to assist the development of the PFRA was the logical approach; as the Flood Forum is set up to facilitate a multi-agency approach to flooding incident in the Vale of Glamorgan.

2.1.4 The composition of the Flood Forum is noted in Table 2. The Preliminary Flood Risk Assessment Report has been reviewed and ratified by the Flood Forum.

Table 2 Vale of Glamorgan Flood Forum

Vale of Glamorgan Council departments, including:	**External Partners, including**:
Civil Protection Unit	Environment Agency Wales
Highways & Engineering	South Wales Police
Parks & Grounds Maintenance	South Wales Fire & Rescue Service
Environmental Health	Welsh Ambulance Service Trust
Waste Management & Cleansing	University Health Board
Communications	Utility Companies

2.2 Engagement

2.2.1 Communicating with Partner Organisations is vital to the success of the Preliminary Flood Risk Assessments and subsequent Flood Risk Management Plans. During this development period there has been the opportunity for partners to share knowledge and ideas that have advised the process and assisted in the creation of the report.

2.2.2 The core members of the Task & Finish group engaged directly, or through the chair of the group, with partner organisations including Dwr Cymru/ Welsh Water (DCWW), Neighbouring Local Authorities and the Environment Agency Wales

3 Methodology and data review

3.1 Information held by Vale of Glamorgan Council

3.1.1 Data pertaining to flooding and flood risk within the Vale is held in both paper and electronic format. The information held by each Department has been reviewed and collated.

3.1.2 All this data was available from within the various council departments. The data is derived from flood studies, flooding incidents attended by the Council and reports of flooding from members of the public. It should be noted that the accuracy of the flooding data may be compromised by flooding not being reported to the Council or a single reported incident covering several properties.

3.1.3 The length of historic records may miss large, infrequent events, and hence under represent the long term average number of flood incidents. The reliability of older records has been considered when gathering/ reviewing the data held.

3.2 Information provided by Environment Agency

3.2.1 **Flood Map –** Shows extent of flooding from river catchment of more than 3km^2 in floods with 1% and 01% chance occurring in any year; and the extent of flooding from the sea with 0.5% and 0.1% chance of occurring in any year.

3.2.2 **Historic Flood Map** – Merged, unattributed flood extent for records of flooding from rivers, sea and groundwater. It is derived from appropriate Flood Event Outlines.

3.2.3 **Areas susceptible to Surface water Flooding** – Single rainfall event with 1 in 200 chance of occurring in any year. Three bandings, indicating ‘less’ to ‘more’ susceptible to surface water flooding.

3.2.4 **Flood Map for Surface Water –** Outline of areas which could flood from surface water in storms with a 1 in 30, and 1 in 200, chance of occurring in any year.

3.2.5 **Areas possibly impacted by flooding from Groundwater –** Using surface water flooding maps and underlying geology to map areas likely to be worst impacted by groundwater.

3.2.6 **National Receptor Dataset Property points –** Nationally consistent dataset of receptors. Comprehensive set of building points derived from OS MasterMap Address Layer 2 and MasterMap Topography (Buildings)

3.2.7 **Flood Map for Surface Water Property Count Method –** Document explains how EA produced property counts and how Local Authorities can carry out counts using the same method

3.2.8 **Ogmore to Tawe (Including Thaw and Cadoxton) Catchment Flood Management Plan -** The CFMP considers all types of inland flooding, from rivers, groundwater, surface water and tidal flooding, but not flooding directly from the sea (coastal flooding), which is covered by Shoreline Management Plans (SMPs)

3.2.9 **Taff and Ely Catchment Flood Management Plan -** The CFMP considers all types of inland flooding, from rivers, groundwater, surface water and tidal flooding, but not flooding directly from the sea (coastal flooding), which is covered by Shoreline Management Plans (SMPs)

3.2.10 All the data was readily available online either via the Environment Agencies DataShare service or the Environment Agencies main website. The data was also available through the Environment Agency Local, Regional or National Offices.

3.3 Information Provided by Dwr Cymru/ Welsh Water

3.3.1 **DG5 returns for hydraulic overload –** DG5 records are held by Dwr Cymru/ Welsh Water (and which relate to surface and foul water sewers) in a register that forms the Director General of OFWAT's Report on Issue Number 5.

3.3.2 **Clean and Waste Assets –** DC/WW provided a list of all the clean water and waste water assets in the Vale of Glamorgan.

3.3.3 The DG5 register records the number of properties reported to have been affected by flooding both internally and/or externally due to hydraulic inadequacy, insufficient capacity or failure of the public sewerage system. The accuracy of the data maybe compromised by flooding not being reported by members of the public.

3.4 Information Provided by Welsh Assembly Government

3.4.1 **Historic Sewer and Surface Water Flooding Data –** Historic Sewer flooding data extracted directly from DCWW Asset Management Database (STAM). Records from 18 year period; 1990 to May 2008. Surface Water Flooding data taken from approximately 500 flood defence pre feasibility studies

3.4.2 Data was readily available as the supplied information had previously been placed on the Councils GIS system. The Sewer Flooding data, supplied from STAM Information, has a positional accuracy of 10m. The Surface water flooding data had poor positional accuracy as grid references were derived from road and town names and not OS grid references, or postal addresses/postcodes.

3.5 Information Storage and Sharing

3.5.1 All collated data will be stored either as MapInfo layers or within the council's electronic filing system, within a specific location, with access only for those involved in the preparation of the preliminary flood risk assessment. Information will subject to quality assurance measures to record the quality of the data. The process is a qualitative assessment based on Data Quality System provided in the Surface Water Management Plan Technical Guidance document (March 2010). All the data supplied by partner agencies is restricted to the Vale of Glamorgan Council for the preparation of the preliminary risk assessment unless otherwise stated.

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4 Past Flood Risk

4.1 Significant Harmful Consequences

4.1.1 Any flooding that has an adverse effect on human health, properties and infrastructure could justifiably be defined as significant. For the purposes of the Regulations/Directive events were of a scale, or frequency, to register on a national level.

4.1.2 For the purpose of this report an event with "locally significant harmful consequences" will be defined by using the indicators set out in the Defra/WAG document 'Selecting and reviewing Flood Risk Areas for local sources of Flooding'.

4.1.3 The Indicators are receptors whose loss, temporary or permanent, would cause significant adverse effects. Frequency of flooding is also an important factor to consider.

4.1.4 Table 3 sets out the indicators used to determine locally significant harmful consequences.

Table 3: Indicators for significant harmful consequences

Human Health	Number of People	Based on number of residential properties x2.34
	Critical Services	Includes schools, hospitals, nursing homes, power and water services
Economic Activity	Non Residential Properties	Includes shops and businesses
	Agricultural Land	Areas of land (hectares) based on agricultural grade
	Roads and Rail	Based on length in km
Environment	Area of internationally or nationally designated site	Including Special areas of Conservation; Special Protection Areas; Ramsar sites or Sites of Special Scientific Interests
	Number of nationally / internationally important heritage features	Includes World Heritage Sites; Scheduled Monuments; Listed buildings and Registered parks and Gardens

4.1.5 Details of smaller, less frequent, floods will be recorded elsewhere for the purposes of informing the local flood strategy.

4.2 Past Flood Events

4.2.1 Table 4 contains the information available on historic floods of significant harmful consequences within the Vale of Glamorgan.

4.2.2 Figures 2 and 3 show the outlines of the flood extent for the two floods identified

Table 4: Past flood events of significant harmful consequences

Flood Event	Date	Consequences
Coldbrook	20 July 2007	100 properties Flooded 4 Schools Flooded Local Roads Closed
Llanmaes	28 October 1998	16 Properties Flooded Local Roads Closed

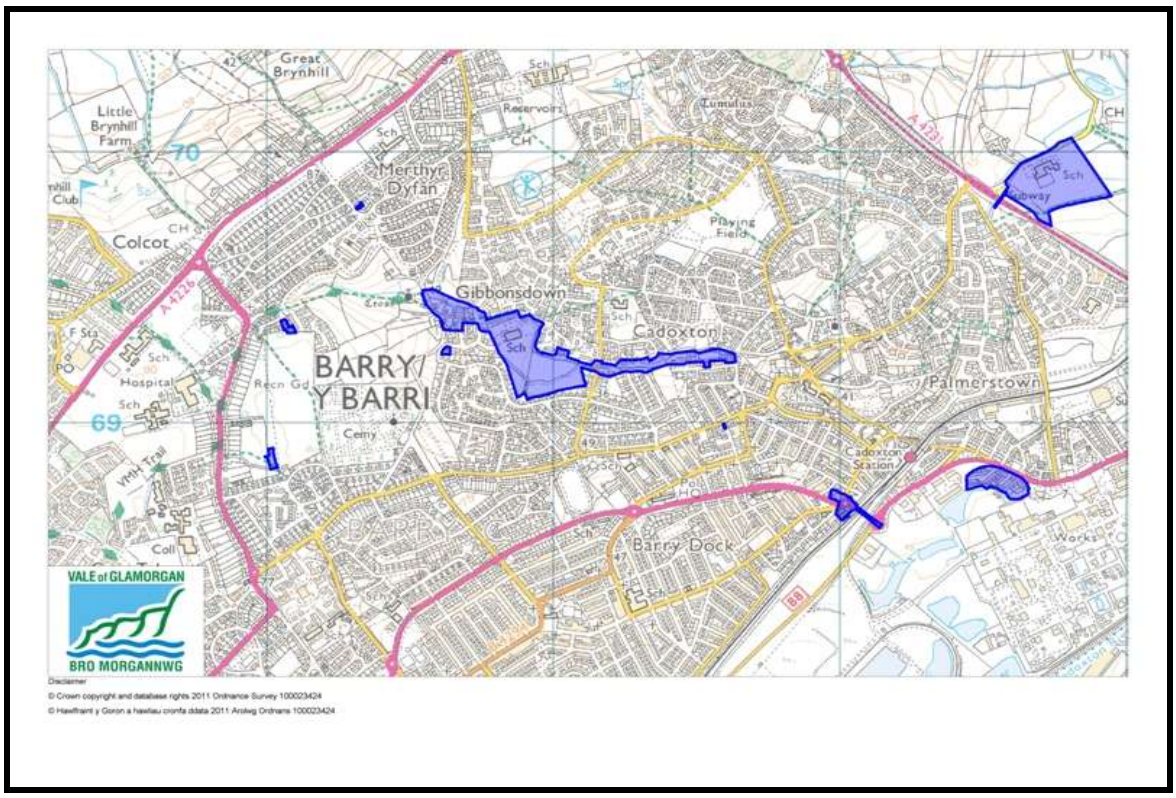

Figure 2: Extent for Coldbrook Catchment Flooding 20th July 2007

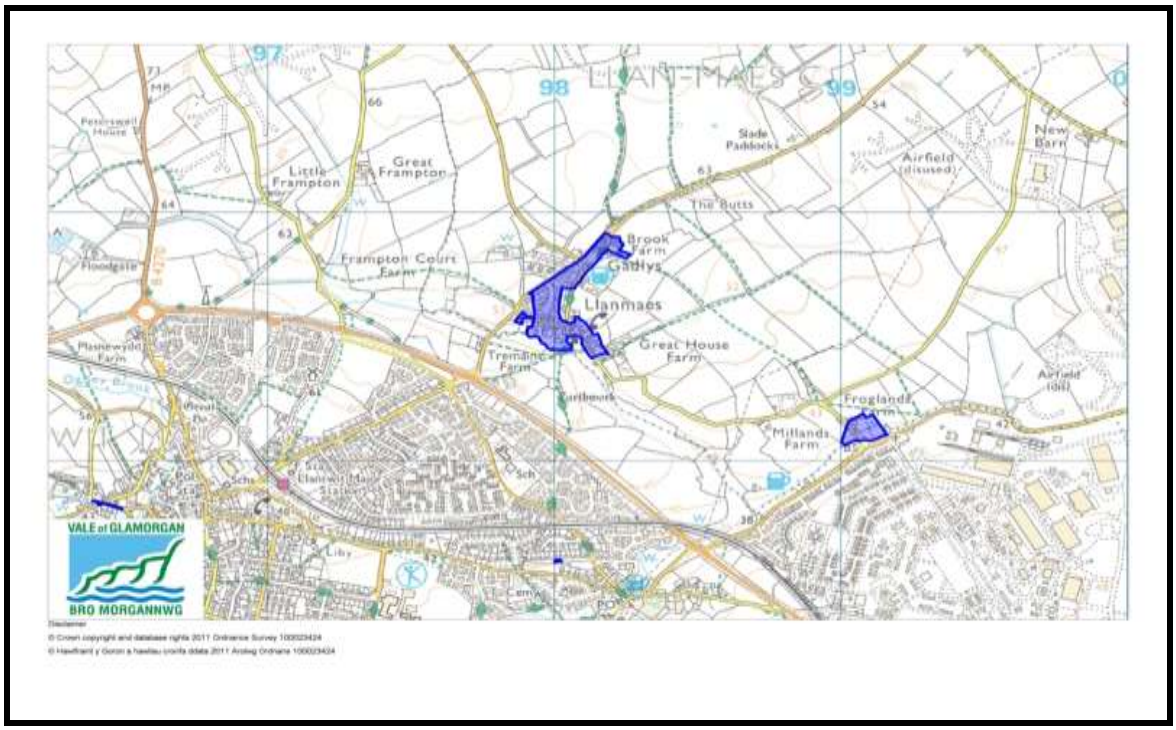

Figure 3: Extent of Llanmaes Flooding 28th October 1998

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5 Future Flood Risk

5.1 Locally Agreed Surface Water Information

5.1.1 The 'locally agreed surface water information' is the Flood Map for Surface Water for a 1 in 200 rainfall event deep combined with local information on surface water flooding, see figure 4. There is no locally available definitive data on drainage capacity, within the Vale. As such it is reasonable to use the derived adjustments from the Flood Map for Surface Water.

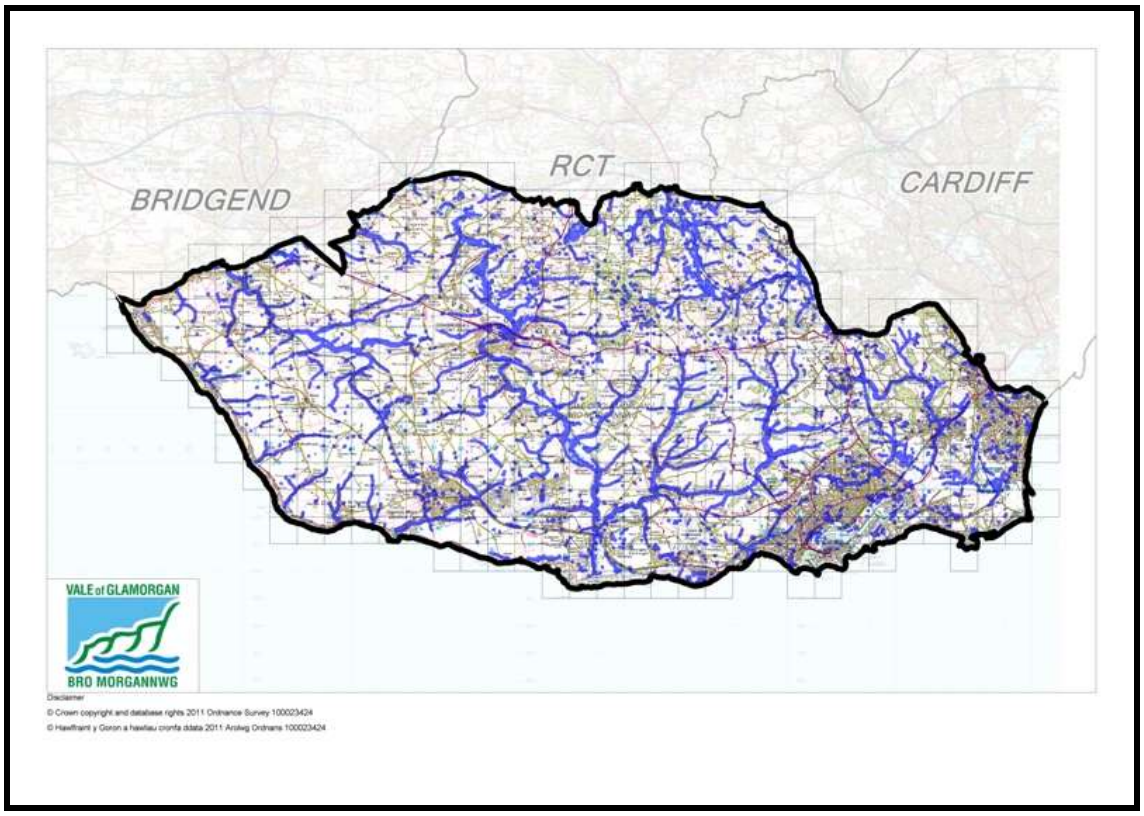

Figure 4 Locally Agreed surface Water Map

5.1.2 Future flood risks are determined using the 'locally agreed surface water information' and the indicators for significantly harmful consequences, as set out in Table 3.

5.1.3 Table 5 indicates the number of receptors at risk of surface water flooding using the property count method devised by the Environment Agency. For further information on method see guidance document produced by EA: *'Flood Map for Surface Water Property Count Method'.*

Table 5: Future Flood Risk

Location	Consequences (receptors at risk of flooding)
Dinas Powys	264 residential properties 38 commercial properties 2 Schools 1 Electricity Substation
Llantwit Major	213 residential properties 69 commercial properties 2 schools 1 Emergency Service 2 Electricity Substation
Cowbridge	178 residential properties 82 Commercial properties 1 School 1 Electricity substation

5.1.4 Figures 5, 6 and 7 show the outline of the future flood risk identified using the 'locally agreed surface water maps'.

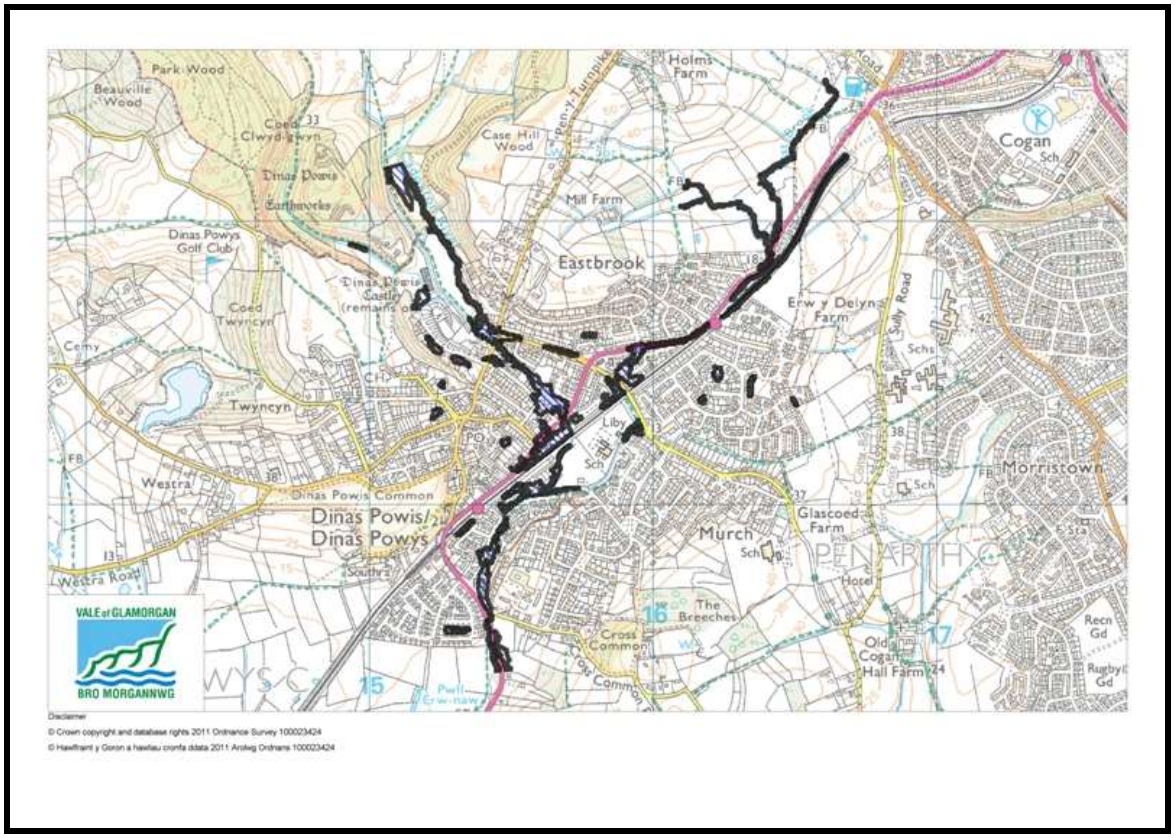

Figure 5 Extent of Dinas Powys Flood Risk

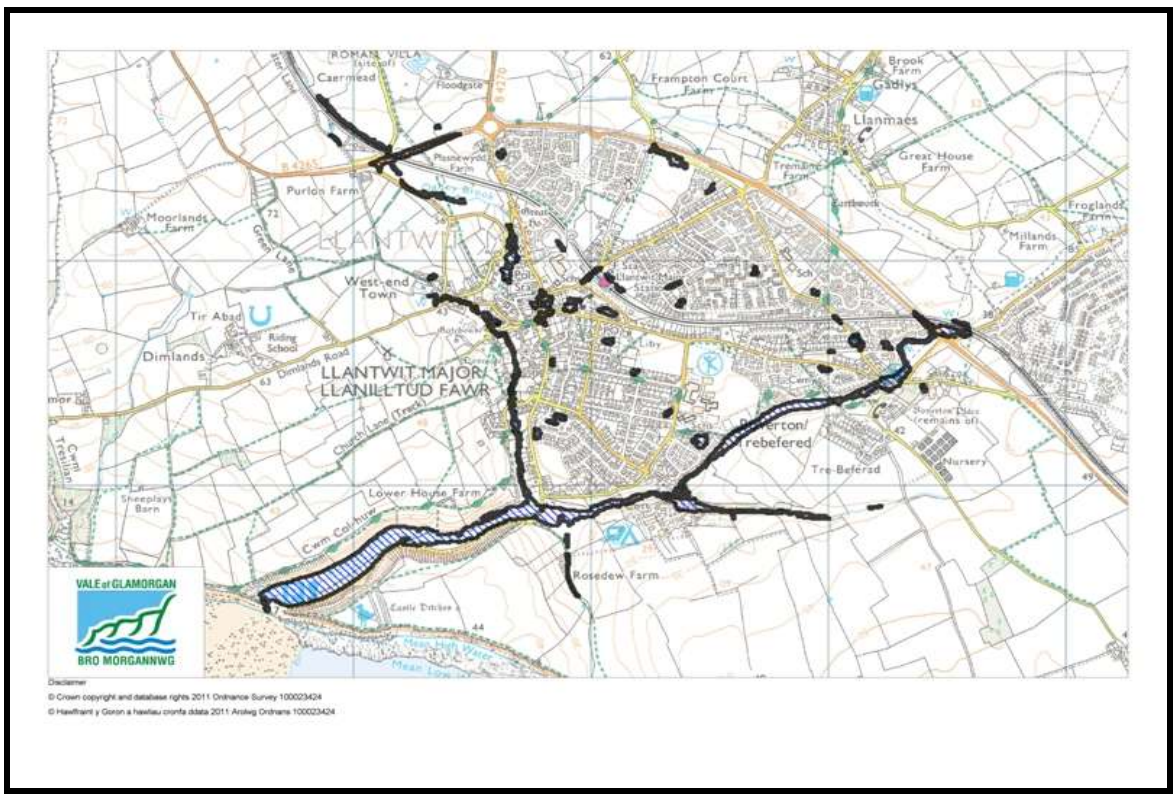

Figure 6 Extent of Llantwit Major Flood Risk

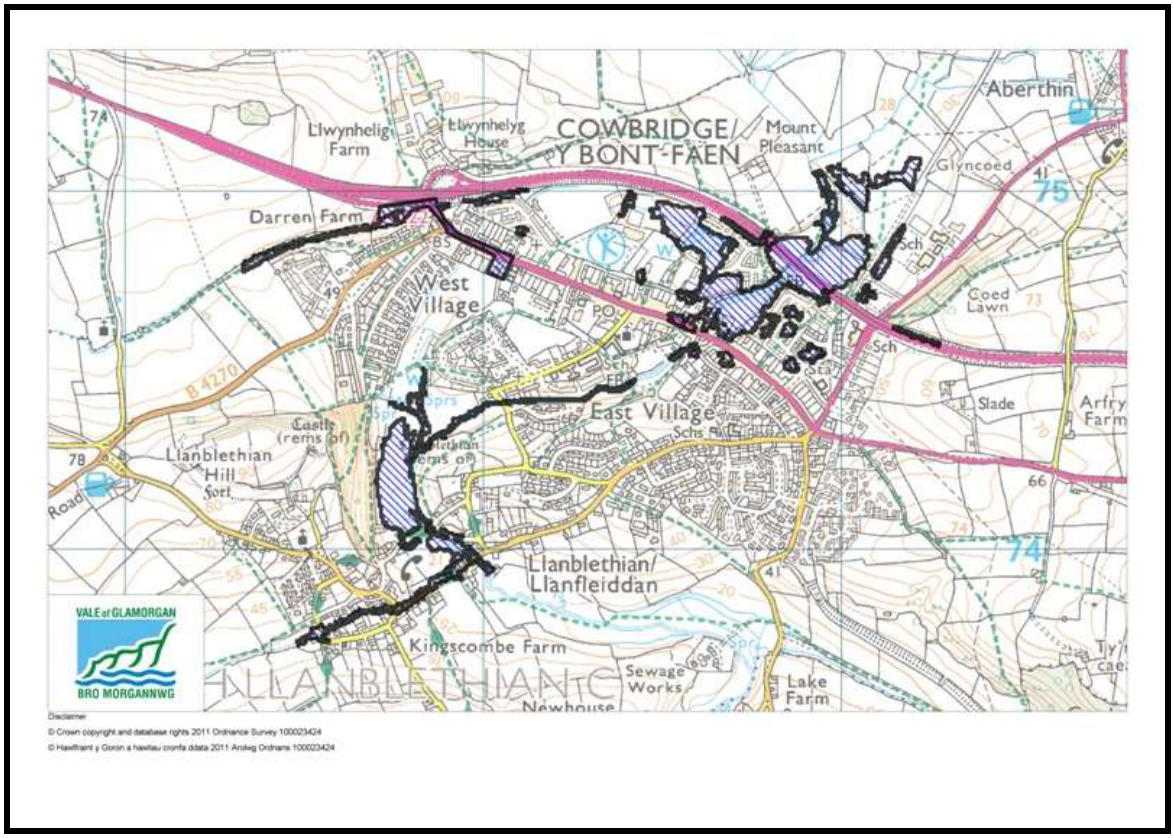

Figure 7: Extent of Cowbridge Flood Risk

5.2 The Impacts of Climate Change

5.2.1 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%.

5.2.2 Key Projections for Western Wales 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 15% (very likely to be between 3 and 33%)
- Precipitation on the wettest day in winter up by around 12% (very unlikely to be more than 27%)
- Relative sea level at Swansea 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 12 and 20%

Increases in rain are projected to be greater near the coast than inland.

5.2.3 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 floodingespecially in the steep, rapidly responding catchments typical of Western Wales. 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.

Rising sea or river levels may 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.

5.2.4 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.

5.2.5 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)

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6 Review of Indicative Flood Risk Areas

6.1 Indicative Flood Risk Area

6.1.1 The Environment Agency has not identified any Indicative Flood Risk Areas within the Vale of Glamorgan, although it should be noted that there are implications to the Vale from the Indicative Flood Risk Area covering Cardiff.

6.1.2 The areas of the Vale of Glamorgan impacted by this indicative Flood Risk Area are mainly in the Wenvoe and Culverhouse locality. The people/properties and services affected, within the Vale, are as follows:

- 88 residential properties equating to 206 people.
- 2 critical services.
- 59 non-residential properties.

6.1.3 The information provided by the EA has been reviewed and changes to the Cardiff Indicative Flood Risk Area have been considered. Following discussions with the City and County of Cardiff Council and the EA, the decision has been taken to propose minor changes to the indicative Flood Risk Area in order to more accurately reflect local conditions The proposal is to amending the boundary slightly to follow the administrative boundary of the City and County of Cardiff Council.

6.1.4 The areas removed from the Indicative Flood Risk Area will be dealt with within the local flood strategy

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7 Identification of Flood Risk Areas

7.1 Flood Risk Areas

7.1.1 No indicative flood risk areas have been identified within the Vale of Glamorgan

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8 Next Steps

8.1 Review Cycle Support and Information Collection

8.1.1 Review of the information contained in this report will be undertaken by 22nd June 2017 and every six years thereafter.

8.1.2 Local GIS information will be supplied to Environment Agency to improve the receptors data used to produce the National Receptors Dataset.

8.1.3 A strengthening of the processes of data collection regarding flooding as in the next cycle of the PFRA, the Directive requires more information on flooding that occurs in the future.

8.1.4 A process is being considered for the gathering of standardised flooding information. Any form being devised should be based around the information required in the Past Flood Risk spreadsheet (Annex 1).

8.1.5 An online form for members of the public to report flooding incident is being considered. This would need to be complemented by paper copy to be supplied to members of the public on request. The form should be based around the information required in the Past Flood Risk spreadsheet (Annex 1).

8.1.6 Flooding Information from partner agencies be gathered via the Vale of Glamorgan Flood Forum is being considered.

8.1.7 All flooding information will be stored and maintained within the Councils electronic filing system. Allowing ease of access and a more effective administration of the records.

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9 References

Flood and Water Management Act 2010

The Flood Risk Regulations 2009

Environment Agency (2010). *Preliminary Flood Risk Assessment (PFRA) Final Guidance.*

Environment Agency (2010). *Preliminary Flood Risk Assessment (PFRA) Annexes to the Final Guidance*

Environment Agency (2010). *What is the Flood Map for Surface Water. Guidance for Local Resilience Forums, regional Resilience Teams, Local Planning Authorities and Lead Local Flood Authorities v1 November 2010*

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Environment Agency (2010). *National Receptors Dataset. Guidance for Environment Agency Staff and professional partners.*

Environment Agency (2010). *Flood Map for Surface Water property Count Method Annex to Flood Map for Surface Water Guidance for Local Resilience Forums, Regional Resilience Teams, Local Planning Authorities and Lead Local Flood Authorities to explain method used for property counting. v1 November 2010*

Environment Agency (2010). *Areas Susceptible to Groundwater Flooding*

Environment Agency (2010). *Historic Flood Map. Guidance for Professional Partners*

Environment Agency (2009). *Areas Susceptible to Surface Water Flooding Guidance for Local Planning Authorities in Wales for land use planning and other purposes (not emergency planning) v1 October 2009*

Environment Agency (2010). *Guidance for Detailed River Network GeoStore Users*

Environment Agency (2010). *Main Rivers. Guidance for Local Planning Authorities in England and Wales*

Environment Agency (2010). *Flood Map. Guidance for Professional Partners*

Environment Agency (2010). *Flood Map for Surface Water – LPA Update – May 2010*

Environment Agency (2011). *Flood Risk Regulations. PFRA FAQs. Version 1, February 2011*

DEFRA & WAG (2010). *Selecting and reviewing Flood Risk Areas for local sources of flooding. Guidance to Lead Local Flood Authorities. Flood Risk Regulations 2009*

Environment Agency (2010). *Ogmore to Tawe (including Thaw and Cadoxton) Catchment Flood Management Plan*

Environment Agency (2010) *Taff and Ely Catchment Flood Management Plan*

Annex 1: Records of past floods and their significant consequences (Preliminary Assessment Spreadsheet)

Please refer to Annex 1 of the Preliminary Assessment Spreadsheet attached with this report. This spreadsheet includes records of past floods within the Vale of Glamorgan, including details of their consequences.

Annex 2: Records of future floods and their significant consequences (Preliminary Assessment Spreadsheet)

Please refer to Annex 2 of the Preliminary Assessment Spreadsheet attached to this report. This spreadsheet includes records of future flood risk within the Vale of Glamorgan, including details of their consequences.

Annex 3: Records of Flood Risk Area and its rationale (Preliminary Assessment Spreadsheet)

Please refer to Annex 3 of the Preliminary Assessment Spreadsheet attached with this report. However, as discussed in Chapter 6, due to the lack of any Indicative Flood Risk areas within the Vale, no details have been recorded in this section.

Annex 4: Review Checklist

Please refer to Annex 4, attached to this report, which contains the Review Checklist that has been provided by the Environment Agency to act as a checklist for reviewing the PFRA submission