

Blaenau Gwent County Borough Council Stage 1 Strategic Flood Consequence Assessment

D129363 - Final
June 2010

Revision Schedule

**Strategic Flood Consequence Assessment
June 2010**

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Executive Summary

This Stage 1 Strategic Flood Consequence As

| 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

- 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 DAM flood zone (% of site) | | | Area within Environment Agency Flood Zone (% of site) | | | Area Within ASTSFW (% of site) | Historical Evidence of Flooding | Inclusion in Stage 2 SFCA? | | |
|---------------------|-----------------------|--|----------------------|--|------|---|--|------|---|--------------------------------------|---------------------------------------|-------------------------------|-------------------------------|-------|
| | | | | A | B | C | 1 | 2 | 3 | | | | Less | Inter |
| Ebbw Vale | Ebbw Vale North | MU1 | 48.70 | 99 | 0 | 1 | 99 | 0 | 1 | 15 | 5 | 1 | 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 |
| | Cartref Aneurin Bevan | A25 | 0.38 | 100 | 0 | 0 | 100 | 0 | 0 | 82.0 | 13.0 | 0.0 | DCWW and SWF&R | Yes |

| Area within DAM flood zone (% of site) | Area within Environment Agency Flood Zone (% of site) | Area Within |
|--|--|-------------|
|--|--|-------------|

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 | |

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

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

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

3.3.15

Reservoir Name [REDACTED]

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 A . p 6 p 2 e n E d M i C x

4.3.8 The DAMS and Environment Agency Flood Maps do not include an allowance for climate change. Therefore, in locations where climat

4.4.4 In order to sustainably manage flood risks through the CFMP area, policies have been identified

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. ^{ture.12}

- 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

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

- 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 flb(o)-2(ea)5(s that)6(are)6yyc0.0ror ca(m ek01 Tc ig1defe)5(n>o Su2d)s that k01 Tc 46

- 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 potentially impact on downstream areas by increasing flood

- 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 developmeom2>chemes.
- 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 strategic2>cale, for example with a number of sites contributing to large >cale jointly funded and managed SuDS, however, each developmeom2site must offset its own increase in runoff and attenuation cannot be “traded” betweeno 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. cala n developoe guin,nance of ded' incr

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 suit ability to meet the three aims for sustainability

| Management Train | Component | Description | Water Quantity | Water Quality | Amenity Biodiversity |
|------------------|-------------|---|----------------|---------------|----------------------|
| | Green roofs | Layer of vegetation or gravel on roof areas | | | |

Key: " – highly suitable, | - suitable depending on design, 2 - 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 |
|----------------|--------------|--------------|---|
| | Low/Moderate | Glacial Till | Predominant drift deposits located along valley bases throughout the study area. Also |

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4.8.36 The most convenient vehicle for agreeing long-term management responsibilities is through Section 106 of the Town and Country PI

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

| Town/ Settlement | Description | Area within DAM flood zone (% of site) | Area within Environment Agency Flood Zone (% of site) | Area Within ASTSFW (% of site) |
|---------------------|-------------|--|--|--------------------------------------|
| | | | | |

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.

6 References

- DEFRA, (2005). Making Space for Water
- DEFRA/Environment Agency (2005). Flood Risk Assessment Guidance for New Development - Phase 2. Framework and Guidance for Assessing and Managing Flood Risk for New Development – Full Documentation and Tools. R&D Technical Report FD2320/TR2;
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Appendix A – Figures

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

Figure 2 – Overview of ma

Appendix B – Policy Review

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 | |

- 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.

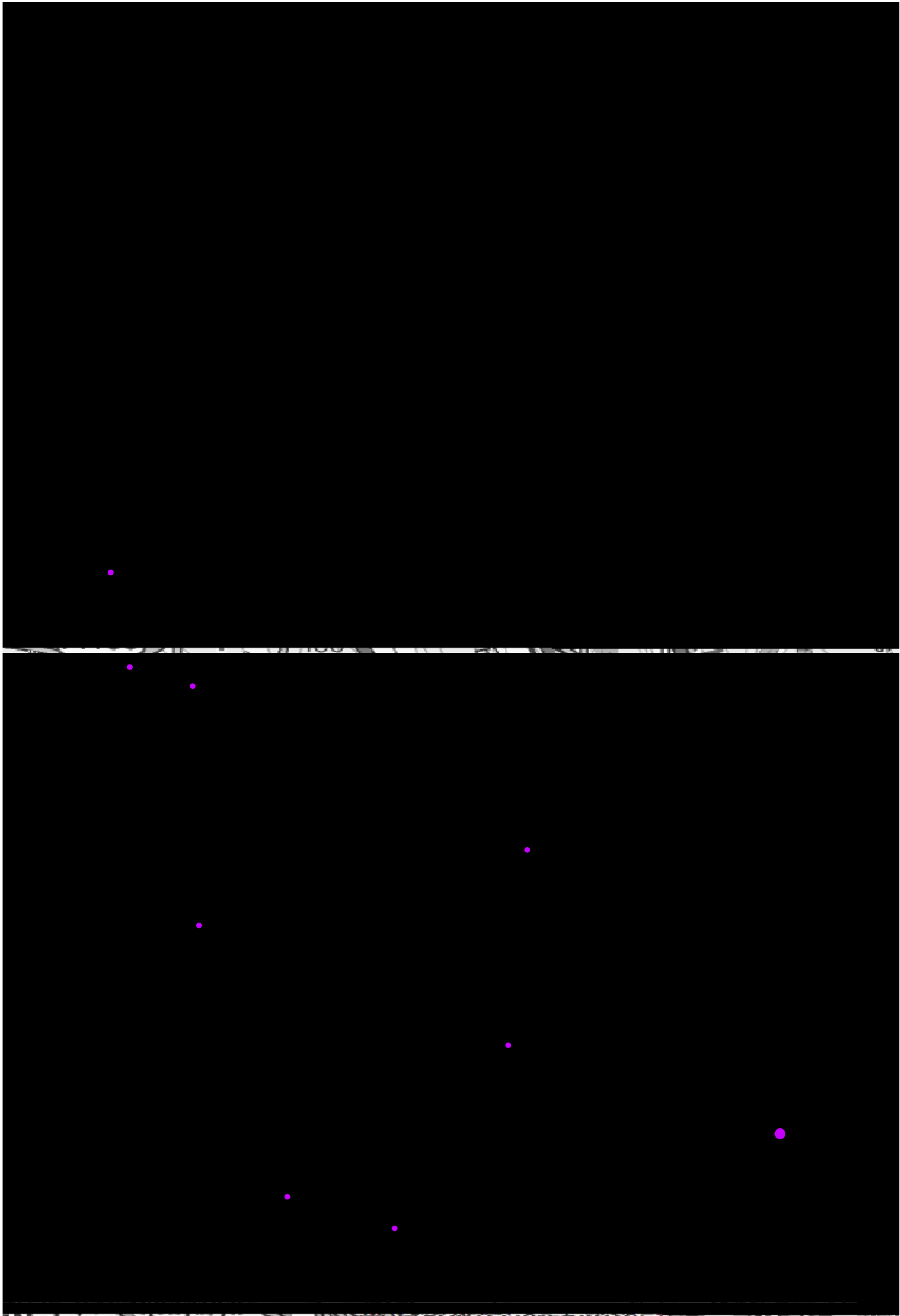
Blaenau Gwent Local Development Plan

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

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

| Date | Flood Source |
|------|--------------|
|------|--------------|

| 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 | | | |



Appendix D – Flood Defence Information for Blaenau Gwent

Table D 1

Appendix E – Gwent Flood Arrangements Information

Table E 1 below summarises the following roles a