

Telford and Wrekin Council

LLFA Flood Risk Management Strategy



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Telford & Wrekin
COUNCIL

GLOSSARY

| | | |
|-------|---|---|
| AMP | - | Asset Management Plan |
| CAM | - | Condition Asset Manual |
| CAMC | - | Creating Asset Management Capacity |
| CFMP | - | Catchment Flood Management Plan |
| CRT | - | Canal and Rivers Trust |
| DEFRA | - | Department for Environment Food & Rural Affairs |
| DfT | - | Department for Transport |
| DTM | - | Digital Terrain Map |
| EA | - | Environment Agency |
| FDGiA | - | Flood Defence Grant in Aid |
| FMfSW | - | Flood Map for Surface Water |
| FWMA | - | Floods and Water Management Act |
| GIS | - | Geographic Information System |
| IDB | - | Internal Drainage Board |
| IPP | - | Individual Property Protection |
| IUD | - | Integrated Urban Drainage |
| LDF | - | Local Development Framework |
| LiDAR | - | Light Detection and Ranging. |
| LLFA | - | Lead Local Flood Authority |
| LPA | - | Local Planning Authority |
| MAFP | - | Multi Agency Flood Plan |
| MIS | - | Management Information System |
| NFCDD | - | National Flood and Coastal Defence Database |
| NFU | - | National Farmers Union |
| PFRA | - | Preliminary Flood Risk Assessment |
| RFCC | - | Regional Flood and Coastal Committee |
| RMA | - | Risk Management Authority |
| SAB | - | Suds Approving Body |
| SEA | - | Strategic Environmental Assessment |
| SFRA | - | Strategic Flood Risk Assessment |
| STW | - | Severn Trent Water |
| SUDS | - | Sustainable Urban Drainage Systems |
| SWMP | - | Surface Water Management Plan |
| TWC | - | Telford and Wrekin Council |
| WaSC | - | Water and Sewerage Company |
| WFD | - | Water Framework Directive |
| WIA | - | Water Industry Act |

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INTRODUCTION

The Flood and Water Management Act (2010) has designated Telford and Wrekin Council as a Lead Local Flood Authority (LLFA), and as such has a responsibility to develop, maintain, apply and monitor a strategy for local flood risk management for the Borough.

The Flood and Water Management Act states that this strategy must specify:

- The risk management authorities in the authority's area;
- The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area;
- The objectives for managing local flood risk;
- The measures proposed to achieve those objectives;
- How and when the measures are expected to be implemented;
- The costs and benefits of those measures, and how they are to be paid for;
- The assessment of local flood risk for the purpose of the strategy;
- How and when the strategy is to be reviewed; and
- How the strategy contributes to the achievement of wider environmental objectives.

The overarching aim of the strategy is to provide a robust local framework that employs a full range of complementary approaches towards managing and communicating the risks and consequences of flooding arising from surface runoff, groundwater and ordinary watercourses in the Borough.

The information included in this document has resulted in the establishment of 23 Flood Risk Policies as set out in the Action Plan in Section 18. These policies aim to ensure that existing flood risk is properly managed, and that the impacts of any future risk as a result of future development and climate change are effectively mitigated.

The Action Plan for delivering the above objectives contains a mix of long-standing, ongoing high-level actions and short-term, time bound site specific activities that are driven by partnership working and the principle of sustainable development. The integrated approach to delivering the broad aim of the strategy means that although specific actions and measures have been proposed to promote the achievement of particular objectives, some actions will inevitably help to achieve more than one objective.

This strategy is a living document and will be reviewed and updated on a 5 year basis, or when updated information becomes available.

1. RISK MANAGEMENT AUTHORITIES

Many organisations, businesses and individuals are either affected by local flood risk, or have responsibility or an interest in its management. The lead responsibilities for planning flood and coastal erosion risk management functions are as follows:

1.1 TELFORD AND WREKIN COUNCIL - LEAD LOCAL FLOOD AUTHORITY

The Flood and Water Management Act 2010 identifies TWC as the Lead Local Flood Authority (LLFA) for the Borough of Telford and Wrekin and as such are responsible for the management of flood risk from ordinary watercourses, surface water runoff, and groundwater.

The following sections outline the roles and responsibilities of the LLFA under the FWMA and other duties associated with all other functions as a Local Authority:

1.1.1 DUTY TO PRODUCE A LFRM STRATEGY

Develop, maintain, apply and monitor a strategy for local flood risk management of the area for surface runoff, groundwater and ordinary watercourses. The strategy must specify:

- The risk management authorities in the authority's area;
- The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area;
- The objectives for managing local flood risk;
- The measures proposed to achieve those objectives;
- How and when the measures are expected to be implemented;
- The costs and benefits of those measures, and how they are to be paid for;
- The assessment of local flood risk for the purpose of the strategy;
- How and when the strategy is to be reviewed; and
- How the strategy contributes to the achievement of wider environmental objectives.

The strategy must be consistent with the Environment Agency's National Flood & Coastal Erosion Risk Management Strategy. The LLFA must consult all affected risk management authorities and the public about the strategy, and produce a summary of the strategy.

1.1.2 TELFORD & WREKIN COUNCIL STRATEGIC BOARD

All LLFAs must establish appropriate partnerships to help with the collection and sharing of data, and the effective management of flooding within the Borough. The importance of working together is reflected in Regulation 35 of the Flood Risk Regulations and Section 13 of the Flood and Water Management Act.

The objective of the partnership is to provide a forum of relevant senior Telford & Wrekin Council officers and Cabinet Member along with representation from the Environment Agency, utility companies and the emergency services to develop a strategic approach to drainage and flood management and receive

reports from specific working groups and where applicable to inform other related working groups such as the Local Resilience Forum.

The main aims of the partnership are:

- To ensure a holistic approach taking into account the Environment Agency's Catchment Flood Management Plan (CFMP) policy is in place for identifying and resolving existing and future development drainage, flood management and flood defence risks/issues in a spirit of partnership to avoid problems being left unresolved.
- To co-operate on the drainage and flood management implications of new developments arising from the strategic planning process and development control to prevent increased flood risk. To identify the possibility of utilising green infrastructure, Sustainable Urban Drainage Systems (SUDS) and adaptation measures such as flood resistance and resilience measures on new developments and the opportunities for retrofitting SUDS etc to existing infrastructure and development where appropriate.
- To ensure that key risks of mutual concern which may impact on the well being of the community are identified and that joint risk treatment strategies are developed and progressed.
- To ensure information on strategic priorities and key work programmes relating to drainage and flood management in Telford & Wrekin is shared in order to highlight potential problems and opportunities for partnership working to resolve issues or addresses other challenges.
- To ensure systems are in place to enable the optimal sharing of data on each partner's infrastructure in order to provide the best for the benefit of communities.
- To utilise a joint approach and mutual experiences to inform and influence policy and funding issues at the national level.

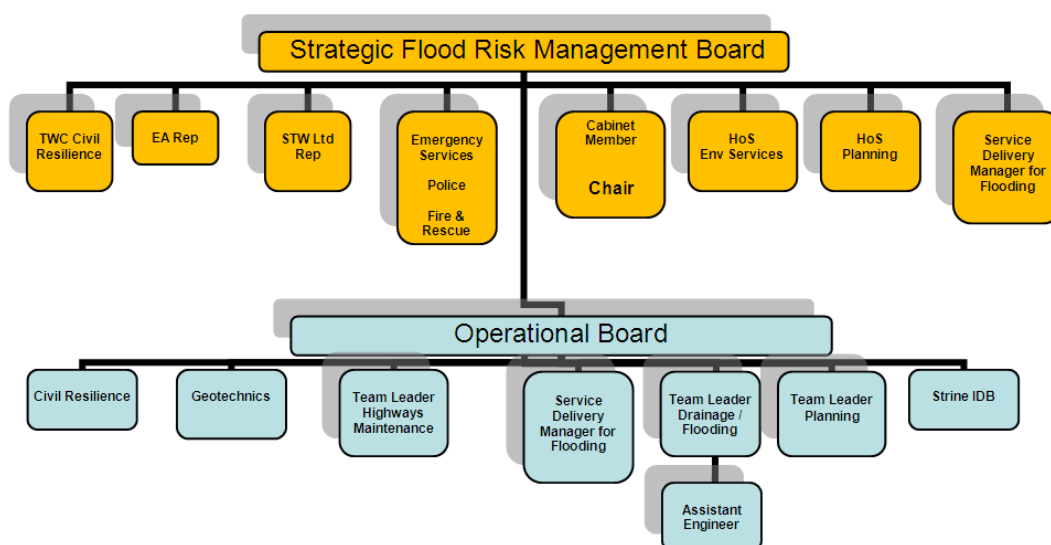


Figure 01 – Strategic Partnership Operational Diagram

1.1.3 TELFORD & WREKIN COUNCIL OPERATIONAL BOARD

The Operational Board sit below the Management Board and is made up of officers at team leader level or equivalent. The aim of the Operational Board is to identify possible flood alleviation projects and any opportunities for joint working within the Council. The work undertaken by the Operational Board can help inform the decisions made at Management Board level.

- To identify possible sources of funding for flood defence projects
- To identify opportunities for joint or collaborative working within the Council and other partner organisations
- To ensure the sharing of data and skills across the Council to best benefit projects
- To ensure that the general public is aware of the flood risk responsibilities and that partner organisations are familiar with their respective roles, responsibilities and duties and that work programmes are aligned accordingly
- To work with developers to ensure that all new development is properly managed and protects the surrounding surface water environment
- To assist in the reporting of flood risk management activity and programmes to scrutiny committees
- SUDS Approval Body – The operational board will take the lead in the running of the SAB. Further information on this section will be added once guidance from central government is available.

1.1.4 REQUIREMENT TO CO-OPERATE WITH OTHER RISK MANAGEMENT AUTHORITIES

Authorities must co-operate with each other in exercising functions. Authorities can also delegate functions to each other by local agreement.

1.1.5 POWER TO REQUEST INFORMATION

LLFAs and the Environment Agency may request information from an individual in relation to the authority's risk management functions. The information must be provided in the form/manner and period specified within the request. Enforcement action may be taken if the individual neglects to comply with the request. A financial penalty may also be imposed.

1.1.6 DUTY TO INVESTIGATE FLOOD EVENTS

LLFA's must investigate flood events that it deems "Locally Significant" within its administrative boundary and publish the results of its findings. These reports should aim to identify the cause of the flooding and also the responsibilities of any other RMA's or riparian owners. Further information on the thresholds for Locally Significant flooding and the methods of reporting can be found in Section 11.

1.1.7 DUTY TO MAINTAIN A REGISTER

LLFAs are required to establish and maintain a register of structures, or features, which may significantly affect flood risk in their administrative area and also provide a record of information about such structures and features, including ownership and state of repair.

The register must be available for public inspection at all reasonable times. This requirement does not apply to the record which may contain personal or other confidential data. Further information on the collection and storage of this information can be found in Section 12.

1.1.8 LAND DRAINAGE AUTHORITY

The Land Drainage Act 1991 identifies Local Authorities as the Land Drainage Authority and as such has permissive powers to undertake flood defence works and powers of enforcement under the Act on Ordinary Watercourses. Further information on the consenting of works on Ordinary Watercourses and enforcement can be found in Section 15 of this strategy.

1.1.9 HIGHWAYS AUTHORITY

TWC are the Highway Authority for the Borough and are therefore responsible for the operation and maintenance of the Borough's highway drainage infrastructure. The ongoing responsibilities associated with this role are outlined in Section 15.5.1 of this strategy.

1.1.10 EMERGENCY PLANNING – CATEGORY 1 RESPONDER

The Civil Contingencies Act (2004) designates Local Authorities as Category 1 responders in an emergency and as such places a number of duties upon them. The work to ensure compliance with these duties is co-ordinated by the Civil Resilience Team.

The team is responsible for developing, maintaining, training and exercising the necessary contingency plans to ensure the Council can meet the statutory requirements placed upon it to respond in an emergency. This includes promoting business continuity to the wider community and developing and maintaining appropriate business continuity processes for the Council itself. The team works closely with other Category 1 and 2 responders, relevant teams within the Council as well as the Voluntary Sector to ensure plans are fit for purpose and will deploy the necessary expertise and resources to benefit and protect the community during an emergency, whilst promoting a speedy return to 'normality'. The team is an active member of West Mercia Local Resilience Forum.

The responsibilities of the Civil Resilience Team during a flooding event include:

- Ensure all multi-agency partners are aware of their roles and responsibilities to flooding in Telford & Wrekin.
- Ensure a co-ordinated multi-agency response to flooding
- To highlight or identify any known local infrastructure that could be made vulnerable due to flooding.
- Ensure all multi-agency partners are aware of the known local flood risk areas and have procedures in place for action.
- Reduce disruption to communities, utilities and the countryside
- Lead recovery activity to support recovery of communities and businesses
- Maintain critical services within each responding organisation as part of business continuity arrangement

1.1.11 LOCAL PLANNING AUTHORITY

TWC are the Local Planning Authority (LPA) for the Borough, with responsibility for the determination of planning applications and the preparation of statutory land use plans in respect of mineral extraction and associated development and the development of waste management facilities. The LPA is also responsible for the determination of planning applications relating to the activities of its education, social services and highways functions. As a planning authority TWC are required to take account of national planning policy guidance on flood risk, amongst other considerations, in both its development control and forward planning work.

The use of the planning system to ensure that future development does not adversely affect the surrounding surface water environment is essential. Further information on TWC design standards for future development can be found in Section 14 and information on the process of adoption of SUDS features by TWC can be found in Section 14.1.

1.1.12 ENVIRONMENTAL MAINTENANCE

TWC own a significant amount of land within the Borough and are therefore classed as the riparian owner of any watercourses or other surface water drainage features crossing land in its ownership. TWC Environmental Maintenance Department is responsible for the maintenance of these features and undertakes the following maintenance operations:

- Litter and debris removal from the edge and margins of watercourses and water bodies;
- Removal of accumulated litter and debris on grilles and trash screens on Council owned assets where there is a defined responsibility to do so;
- Management of vegetation including overhanging trees, shrubs and scrub. Works undertaken during the autumn and wintertime to reduce impact on wildlife;
- Trimming back and removal of aquatic vegetation to prevent encroachment into the main body of the watercourse where there is a defined responsibility to do so. Works undertaken after site specific assessment regard being paid to the habitat and its occupants.
- Grass Maintenance to include a range of appropriate grass cutting regimes to provide for a range of uses i.e. short amenity type grass to long grass / wildflower management. Cutting frequencies range from weekly to once yearly depending on desired outcome.

With the new process of adoption of SUDS features by TWC the skills and experience of the Environmental Maintenance department will be key in ensuring that the proposed vegetation associated with these features can be properly and safely managed over the lifetime of the feature.

1.2 ENVIRONMENT AGENCY

The Environment Agency (EA) is the non-departmental public body set up to protect the environment from threats such as flooding and pollution. While local authorities are responsible for setting local strategy for local flood risks, the Environment Agency plays a key role in setting national strategy for flood and coastal erosion risk management and provides support and guidance to local authorities.

Specific responsibilities in relation to flood risk management include:

- Strategic overview for all forms of flood risk
- Development of the national strategy to cover all forms of flood risk
- Responsibility for coastal and fluvial flood risk management from main rivers
- Powers to request information from any person in connection with the EA's flood and coastal erosion risk management functions
- A duty to report to Ministers on flood risk management including implementation of the strategies
- Statutory consultee to the sustainable drainage systems approving body on sustainable drainage
- Ability to issue levies to lead local flood authorities.

1.2.1 STRATEGIC OVERVIEW

The Environment Agency has a strategic overview of flooding from all sources (including rivers, the sea, surface water and groundwater). Under the Flood and Water Management Act, the Environment Agency has worked with Defra to develop the National Flood Risk Management Strategy.

1.2.2 MAIN RIVERS

The Environment Agency is responsible for managing flood risk from designated main rivers. The Environment Agency is responsible for operating, maintaining and replacing flood risk management installations, such as flood barriers, gates, pumping stations and sluices.

1.2.3 MAINTENANCE WORK

Whilst the primary responsibility for maintenance lies with the landowner, the Environment Agency has permissive powers to reduce the risk of flooding by undertaking maintenance work in main rivers and to river defences.

An annual maintenance programme includes both routine and other activities, including:

- Maintaining flood barriers and pumping stations
- Inspection and repair of flood defence structures
- Controlling aquatic reeds within rivers
- Clearing grills and removing obstructions from rivers.

A number of categories are used to decide whether the Environment Agency will maintain a watercourse or flood defence, and the level of maintenance required. Maintenance of defences will continue:

- Where there is an economic case to reduce the risk from flooding
- Where they are required to protect internationally designated environmental features from the damaging effect of flooding
- Maintenance of flood defences that do not fit within the two categories above, but where work is justified due to legal commitments or where stopping maintenance would cause an unacceptable flood risk, will be continued.

An overview of Environment Agency maintenance programmes is available on the EA website.

At present the EA hold all information on their flood defence assets on the Creating Asset Management Capacity (CAMC) programme which has replaced the National Flood and Coastal Defence Database (NFCDD).

CAMC will support the improved efficiency and effectiveness of EA assets and incident management operations including those in Flood and Coastal Risk Management (FCRM), Water Resources, Navigation and Hydrometry and assist other flood and coastal risk management operating authorities, namely lead local flood authorities (LLFAs) and Internal Drainage Boards.

Following the successful delivery of AIMS earlier this year, CAMC Phase 2 is now underway, and will deliver new tools and processes, working with the business to embed new ways of working.

1.2.4 PROVISION OF NEW FLOOD SCHEMES

The Environment Agency invests to improve existing or provide new installations in areas where there remains a high risk of fluvial flooding. Such works could involve strengthening river walls or embankments, realigning watercourses, digging flood relief channels or building new weirs or sluices.

1.2.5 FLOOD MAP

The Environment Agency is responsible for producing and maintaining the Flood Map, which uses data from modelling and past flood events to map flood extents and provides an important means of increasing awareness of flood risk. It is used by a wide range of organisations, including local authorities, insurers and developers, and is accessible to members of the public via the 'What's in Your Backyard' section of the Environment Agency website.

1.2.6 RESERVOIRS

The Reservoir Act 1975 makes the owners and operators of reservoirs responsible for the safety of the structures that they manage. Owners and operators are obliged to ensure appropriately qualified engineers undertake assessments of all reservoir structures on a routine basis. The Environment Agency enforces the Act for reservoirs in excess of 25,000m³ and have a number of roles:

- Maintaining a register of reservoirs
- Enforcing compliance
- Producing and maintaining the reservoir flood map

Following the Pitt Review, Defra and the Environment Agency were allocated the task of producing flood maps for every reservoir under the Reservoirs Act 1975. The flood maps indicate the likely extent of flooding that would result from a reservoir failure. The maps have been shared with local resilience forums to enable them to prepare off-site reservoir flood plans. The maps are for the purpose of emergency planning only, to ensure that responders know who may be at risk.

1.2.7 EMERGENCY PLANNING

The Environment Agency has the key role in warning people about flood risk from main rivers and the sea and managing the effects of flooding. As a Category 1 Responder, the Environment Agency is a key member of the Telford Local Resilience Forum and participates in the development of multi-agency flood plans.

1.2.8 DEVELOPMENT CONTROL AND SPATIAL PLANNING

The Environment Agency, alongside Natural England and English Heritage, is a statutory consultee to the development consent process, as specified in the Town & Country Planning (Development Management Procedure) Order (England) (2010) and is also a statutory consultee under the provisions of the Town & Country Planning (Environmental Impact Assessment) Regulations 2011. The Environment Agency provides advice to local planning authorities in respect of the development consent regime on matters such as pollution control, waste regulation, fluvial and coastal flood risk and water quality.

The Environment Agency, alongside Natural England & English Heritage, is also a statutory consultee under the terms of the Environmental Assessment of Plans & Programmes Regulations 2004. The regulations require local planning authorities to undertake strategic environmental assessments as part of the local plan preparation process.

1.2.9 WATER QUALITY

The Environment Agency has a duty to maintain and improve the quality of surface water and groundwater and, as part of that duty, is responsible for the control of abstraction from, recharge to, and discharge to watercourses and water bodies (for example rivers and aquifers) under the environmental permitting regime. The Environment Agency monitors the quality of rivers, lakes, the sea and groundwater on a regular basis.

1.2.10 RIVER BASIN MANAGEMENT PLANS

The Environment Agency is the 'competent authority' for implementing the Water Framework Directive in Telford. It produces the river basin management plans.

1.3 SEVERN TRENT WATER

Severn Trent Water (STW) are the Water and Sewerage Company (WaSC) covering the Borough. They have a duty under S94 of the Water Industry Act 1991 (WIA 1991) to provide, maintain and operate systems of public sewers and works for the purpose of effectually draining their area.



Figure 02 – Area covered by STW

Under S117 of the WIA 1991, and within the context of sewerage law WaSCs have a duty relating to premises for ‘domestic sewerage purposes’.

WaSCs have no duties or responsibilities relating to highway drainage, land drainage and watercourses but will accept highway drainage by agreement with the Highway Authority under S115 of the WIA 1991. Water and sewerage services are regulated by Ofwat through 5 year Asset Management Plan (AMP) cycles.

The Flood and Water Management Act 2010 introduced new responsibilities for sewerage undertakers and made them statutory consultees to the sustainable drainage system approving process.

1.3.1 ADOPTION OF PRIVATE SEWERS

On 1 October 2011, sewerage undertakers became responsible for private sewers, which were previously the responsibility of the individual property owners. Not all private pipes are included. How the transfer of private sewers affects properties depends on the type of property and the location and use of the pipe.

1.3.2 SEWER FLOODING

All sewerage undertakers maintain a register of properties which have suffered flooding from public sewers; known as the DG5 Register. This contains details of internal property flooding together with flooding to curtilages, highway and other open areas. It also estimates the anticipated likelihood of repeat flooding but only as a result of hydraulic deficiencies in Severn Trent assets.

Consequently it does not hold details of flooding caused from non-Severn Trent assets (e.g. from highway, land drainage or watercourses). As part of their obligation with Ofwat there is a requirement to undertake capacity improvements to alleviate some of the most severe flooding problems during the current 5 Year AMP period with priority being given to more frequent internal flooding problems.

1.4 STRINE INTERNAL DRAINAGE BOARD

The Strine IDB is located in the north of the Borough and covers an area of approximately 2240ha surrounding the village of Kinnersley as shown in figure 03 below.

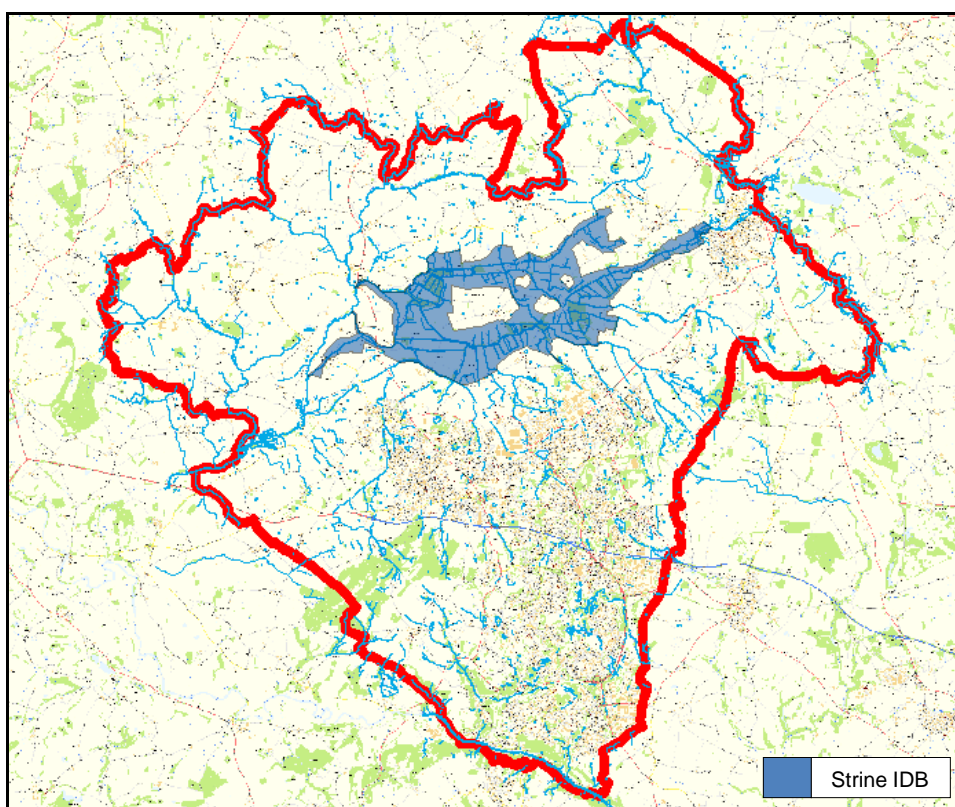


Figure 03 – Area covered by the Strine IDB

The Strine IDB is an operating authority made up of several land owners with permissive powers to undertake work to secure clean water drainage and water level management to ordinary watercourses within their boundary. They are not responsible for watercourses designated as main rivers within their drainage districts; the supervision of these watercourses is undertaken by the Environment Agency. Further information on the roles and responsibilities of the Strine IDB can be found on the [Council website](#).

1.5 HIGHWAYS AGENCY

The Highways Agency is an executive agency, part of the Department for Transport (DfT). It is responsible for managing the core road network within the Borough

The M54 is the only highway in the Borough owned and operated by the Highways Agency. Whilst there is a highway drainage system associated with the motorway itself this discharges directly to the public sewer network operated by STW.

1.6 CANAL AND RIVER TRUST

Although not a Risk Management Authority as defined by the F&WMA, the Canal and River Trust (CRT) formally known as the British Waterways Board is a public corporation that is responsible for the 2,200-mile network of canals and rivers in England, Scotland and Wales.

The CRT is a navigation authority. It inspects, maintains and operates the water control structures within its ownership primarily to meet its statutory obligation to maintain navigation.

CRT is not a Category 1 or 2 responder as defined by the Civil Contingencies Act 2004, and is not therefore required to undertake any specific civil protection duties under the Act. By local agreement, CRT may provide specific assistance in the event of a flood event. Typically this would be in consultation with Silver Command and/or the Environment Agency.

In terms of managing flood risk, the primary responsibility for land drainage and flood prevention rests with private parties. CRT does not have any specific statutory responsibilities in relation to flooding and, therefore, its responsibilities are those of an owner and operator of its canals and other waterways.

Main responsibilities:

- Protecting its own structures, some of which are flood defences
- Its own navigation system and along with other bodies helps to warn the public using the navigation system
- Providing specialist equipment, materials and other resources as appropriate by local agreement.

1.7 REGIONAL FLOOD AND COASTAL COMMITTEES

Although not identified as a RMA Regional Flood and Coastal Committees (RFCC) play an important role in guiding flood management activities within catchments, advising on and approving programmes of work for their areas and continuing to raise local levies under existing arrangements to fund local priority projects and works.

To ensure that the funds made available by the RFCC are fairly allocated, the committee is made up of elected members from Council's within the catchment, along with representatives from the EA and other RMA's. The members have a key role in balancing local priorities and making sure that investment is co-ordinated at the catchment scale and in promoting the consideration of climate change impacts in local decision making.

Further information on the roles and responsibilities of RFCC's can be found on the EA website:

<http://www.environment-agency.gov.uk/aboutus/organisation/38703.aspx>

1.8 RIPARIAN OWNERS AND LANDOWNERS

Although not identified as a Risk Management Authority, riparian owners have responsibilities under common law to maintain watercourses, ditches, culverts, or any other passage through which water flows located on land in their ownership as set out in the Land Drainage Act 1991.

Further information on the roles and responsibilities of riparian owners can be found in Section 15.7 of this strategy.

2. NATIONAL POLICY CONTEXT

The current national legislation and guidance relating to the management of surface water and the use of SUDS is varied and includes high level Government Strategy. This section briefly outlines existing pieces legislation each of which should be taken into account when considering any new development.

In addition this section also outlines existing information on national future climate change which will have a significant impact on the use of SUDS within new developments.

2.1 THE FLOODS AND WATER MANAGEMENT ACT

The Flood and Water Management Act 2010 encourages better protection from flooding, the sustainable management of water, improvement of public services and secure water resources during periods of drought. The Act seeks to reduce flood risk by clarifying who is responsible for management of its sources, encouraging more sustainable forms of drainage in new developments and making it easier to resolve misconnections to sewers.

As a result of the Act TWC has been appointed as the Lead Local Flood Authority (LLFA). The planning process is one if the key areas through which TWC will be managing future flood risk.

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

2.2 WATER FRAMEWORK DIRECTIVE

The Water Framework Directive (WFD) 2000/60/EC commits European Union member states to achieve good qualitative and quantitative status of all water bodies by 2015. The act defines levels of biological and ecological status for water bodies and sets targets the target of all watercourses reaching "good" status by the 2015 deadline.

The increased use of SUDS techniques will help to limit the impact of development on any receiving watercourse by providing levels of treatment prior to discharge and assist in reaching the objectives of the WFD.

2.3 NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The document includes policies relating to development and flood risk which seek to ensure that appropriate sustainable development is in the right place, taking full account of flood risk. It aims to ensure that flood risk is taken into account (at all stages of the planning process), inappropriate development in areas at risk of flooding is avoided and that development is directed away from areas at high risk.

2.4 FLOOD RISK REGULATIONS

The original Floods Directive (Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks) established a framework for assessing and managing flood risk. The main aims were to reduce the “adverse consequences for human health, the environment, cultural heritage and economic activity”.

The regulations require that the Environment Agency is responsible for preparing assessments, maps and plans for main rivers, sea and reservoir flood risk whereas Lead Local Flood Authorities (LLFA) are responsible for all other sources of flooding including where main river, sea or reservoir flooding affects this. Local authority assessment, maps and plans will inform and be informed by local flood risk management strategies under the Flood and Water Management Act 2010. Similarly, the Environment Agency’s assessments, maps and plans will inform their national strategy under the Act.

There will be a public consultation process on the flood risk management plans, which must be consistent with Water Basin Management Plans prepared under the Water Framework Directive.

2.5 PITT REVIEW

Following the severe flooding experienced by the entire country during 2007 the Government instructed Sir Michael Pitt to undertake an independent review of the capabilities and effectiveness of the existing arrangements between RMA’s. The final published report entitled “Learning Lessons from the 2007 Floods” called for urgent and fundamental changes in the way the country was adapting to the likelihood of more frequent and intense periods of heavy rainfall. Searching for practical solutions to highly complex problems and careful thought about the public interest, resulted in challenging recommendations that were deemed to require strong national leadership to make them a reality.

The report included 92 recommendations, of which 21 were specifically referred to local authorities. Of particular importance was the recommendation that local authorities should play a major role in the management of local flood risk, taking the lead in tackling local problems of flooding and coordinating all relevant agencies. This recommendation has been delivered through the Flood and Water Management Act 2010. The Act puts in place the changes recommended by Sir Michael Pitt.

2.6 FUTURE WATER

‘Future Water’ was published in 2008 and is the Government’s Water Strategy for England. It puts forward policies to encourage a more effective and sustainable management of surface water and flood risk, including surface water management plans and SUDS.

2.7 MAKING SPACE FOR WATER

Making Space for Water was published in 2005 and is the government's response for delivering its strategy for flood risk management. It involves the consideration of all sources of flooding and embedding flood risk management in national and local policies. The aim is to develop a more integrated approach to flood risk management which reduces the threat to people and property and delivers environmental, social and economic benefit, consistent with sustainable development principles.

2.8 FLOOD RISK MANAGEMENT PLANS:

Environment Agency and Natural Resources Wales have produced a draft Severn River Basin District Flood Risk Management Plan. This is a requirement of the Flood Risk Regulations 2009. This describes the risk of flooding from rivers, the sea, reservoirs and, for participating Lead Local Flood Authority areas, surface water and groundwater. It sets out how the Environment Agency, Natural Resources Wales and partners will work together, with communities, to manage flood risk in the Severn river basin.

The consultation on the draft flood risk management plan started on 10 October 2014 and closes on 31 January 2015. The Environment Agency and Natural Resources Wales must publish FRMPs prepared by them and Lead Local Flood Authorities by 21 December 2015.

2.9 BUILDING REGULATIONS

Building Regulations exist to ensure the health, safety, welfare and convenience of people in and around buildings. Part H of the Building Regulations specifically covers drainage. In particular, part H3, Rainwater Drainage, strongly recommends a more sustainable approach to surface water management, with a hierarchy that suggests disposal to watercourses and sewers is the last resort.

2.10 THE NATURAL ENVIRONMENT AND RURAL COMMUNITIES ACT 2006

The Natural Environment and Rural Communities Act 2006 requires public bodies to have regard to biodiversity conservation when carrying out their functions. This is commonly referred to as the 'biodiversity duty'. The aim of the biodiversity duty is to raise the profile of biodiversity, such that conservation of biodiversity becomes properly embedded in all relevant policies and decisions made by public authorities.

3. LOCAL POLICY CONTEXT

3.1 SURFACE WATER MANAGEMENT PLAN

A Surface Water Management Plan (SWMP) was completed by TWC in 2007 as part of DEFRA's Integrated Urban Drainage (IUD) pilot studies. It was the aim of the SWMP to bring together information from a range of stakeholders to create a GIS database which could then be used to better inform the planning process and provide information on the impact of future development.

3.2 STRATEGIC FLOOD RISK ASSESSMENT PHASE 1

A Level 1 Strategic Flood Risk Assessment (SFRA) was completed in 2007 for the Borough of Telford and Wrekin. The Level 1 SFRA provides strategic flood risk maps which show flooding from all sources including flood zones and areas at risk of flooding from other sources. The assessments also provide an overview of the implications of climate change for flood risk. The SFRA will help applicants to apply the Sequential Test and prepare site specific Flood Risk Assessments in accordance with the requirements of the National Planning Policy Framework (NPPF).

http://www.telford.gov.uk/info/1004/planning_policy/1554/development_and_flood_risk/2

3.3 STRATEGIC FLOOD RISK ASSESSMENT PHASE 2

A Level 2 Strategic Flood Risk Assessment (SFRA) was completed in 2008 for the Borough of Telford and Wrekin. This study refines and builds upon the work undertaken in the Level 1 SFRA. The study focuses on improving the Floodzone information on Main River and several of the smaller watercourses within the Borough in order to better inform the Sequential Test. This in turn will improve the site selection process as part of the Local Development Framework (LDF).

A copy of the TWC SFRA Phase 1 and 2 can be found at the link below:

http://www.telford.gov.uk/info/1004/planning_policy/1554/development_and_flood_risk/4

3.4 SFRA SUDS ASSESSMENT

In January 2008, TWC commissioned Halcrow to produce a Sustainable Drainage System (SUDS) overview and advise the most appropriate techniques applicable to future developments, both allocated and windfall, within the administrative boundary of the planning authority.

The local soil permeability and Groundwater Source Protection Zone (GSPZ) have been mapped and provide a general overview of the borough and is used to provide an overview of the most suitable SUDS techniques. A copy of the Telford and Wrekin SUDS Assessment can be found at the link below:

http://www.telford.gov.uk/info/1004/planning_policy/1554/development_and_flood_risk/6

3.5 PRELIMINARY FLOOD RISK ASSESSMENT

A preliminary Flood Risk Assessment (PFRA) has been completed by TWC in line with the requirements of the Flood and Water Management Act. The aim of the PFRA is to identify local sources of flood risk, primarily from surface runoff, groundwater and ordinary watercourses. The PFRA is a high level screening exercise which involves collecting information on past (historic) and future (potential) floods, assembling it into a preliminary assessment report, and using it to identify Flood Risk Areas which are areas where the risk of flooding is significant.

Although no nationally significant areas of flood risk were identified within the Borough, the information gathered will allow TWC to identify areas of flood risk that are significant on a local scale.

3.6 MULTI AGENCY FLOOD PLAN

The aim of Telford & Wrekin Council's Multi-Agency Flood Plan is to outline the arrangements which should be implemented to ensure an efficient multi-agency response to extreme flood events.

The plan ensures that all multi-agency partners are aware of their roles and responsibilities to flooding in Telford & Wrekin, and that a co-ordinated multi-agency response is provided. The plan aims to reduce disruption to and lead the recovery of communities, utilities and businesses post flood event.

3.7 IRONBRIDGE FLOOD BARRIERS ACTION PLAN

The Ironbridge Flood Barriers Action Plan has been created in partnership with the EA, STW, and the local Emergency Services to set out the process of erecting the Ironbridge Temporary Flood Defences.

3.8 COALBROOKDALE RAPID RESPONSE CATCHMENT PLAN

The aim of the Coalbrookdale Rapid Response Catchment Plan is to outline the arrangements which should be implemented to ensure an efficient multi-agency response to the inundation of the Coalbrook.

3.9 WATER CYCLE STUDY

TWC are currently putting together a Water Cycle Study for the Borough. This report has been produced for the purpose of helping TWC progress its Local Plan '*Shaping Places*' and to establish the constraints to development from existing environmental and water infrastructure capacity.

The purpose of this is to provide an informed platform for discussion between the Council development planners, the Environment Agency, and the appropriate water and wastewater service provider (in this case Severn Trent Water), plus other stakeholders.

This report is aimed specifically for use by the TWC but recognises that the information within it will also be of interest to neighbouring Local Authorities whilst they develop their own Local Plans.

4. ASSESSMENT OF EXISTING LOCAL FLOOD RISK

In order to effectively deal with flood events it is essential that TWC have a good understanding of the existing and future flood risk in the Borough.

4.1 HISTORIC FLOOD RISK

The Severn catchment has a long and well-documented history of flooding, with records dating as early as 1258. Recent high profile flood events on the Severn, in October 1998, Autumn 2000, February 2002, New Year 2003 and February 2004 have caused widespread flooding particularly in the Ironbridge Gorge World Heritage Site which is located on the banks of the River Severn.

In 2004 in response to these flood events the EA, in partnership with TWC and STW, funded the erection of the Ironbridge Temporary Flood Defences. Further information on the barriers can be found in Section 16.



Figure 04 – Historic Photo Evidence of Flooding in Ketley Town

In June 2007, a series of high-intensity rainfall events occurred in both June and July, causing widespread flooding from all sources. In total 51 properties were internally flooded during these events, with many more experiencing garden and highway flooding.

More recently 2012 was classified as the second wettest on record in the UK (although the wet weather extended into spring 2013). According to data released by the Met Office, the total rainfall for the UK during 2012 was 1,330.7mm (52.4in), just 6.6mm short of the record set in 2000. This prolonged period of heavy rainfall resulted in many flooding issues that had not previously been reported due to the steady rise of groundwater and increased levels in storage reservoirs and watercourses.

The winter of 2014 also resulted in flooding in the Borough, with the highest and most prolonged flood levels on the River Severn since 2008.

4.2 ASSESSMENT OF EXISTING LOCAL FLOOD RISK

Whilst information on historic flooding is an important resource, TWC also hold a significant amount of data on existing and potential flood risk. This includes detailed mapping of Floodzones associated with main rivers and ordinary watercourses (fluvial flooding), areas susceptible to flooding during extreme rainfall events (pluvial flooding), areas potentially at risk of flooding due to reservoir failure, and areas susceptible to groundwater flooding.

4.3 IDENTIFICATION OF CATCHMENT AREAS

In order to understand which areas are most at risk of flooding, the Borough has been split into four catchment areas as shown in figure 05. These areas have been identified through the use of the contour information the Council holds within the GIS database. Sub-catchments have been identified within these catchment areas, with LiDAR data being used where available for greater accuracy. It should be noted however that the public sewerage network serving the Borough may direct surface water that would normally flow through one catchment into another.

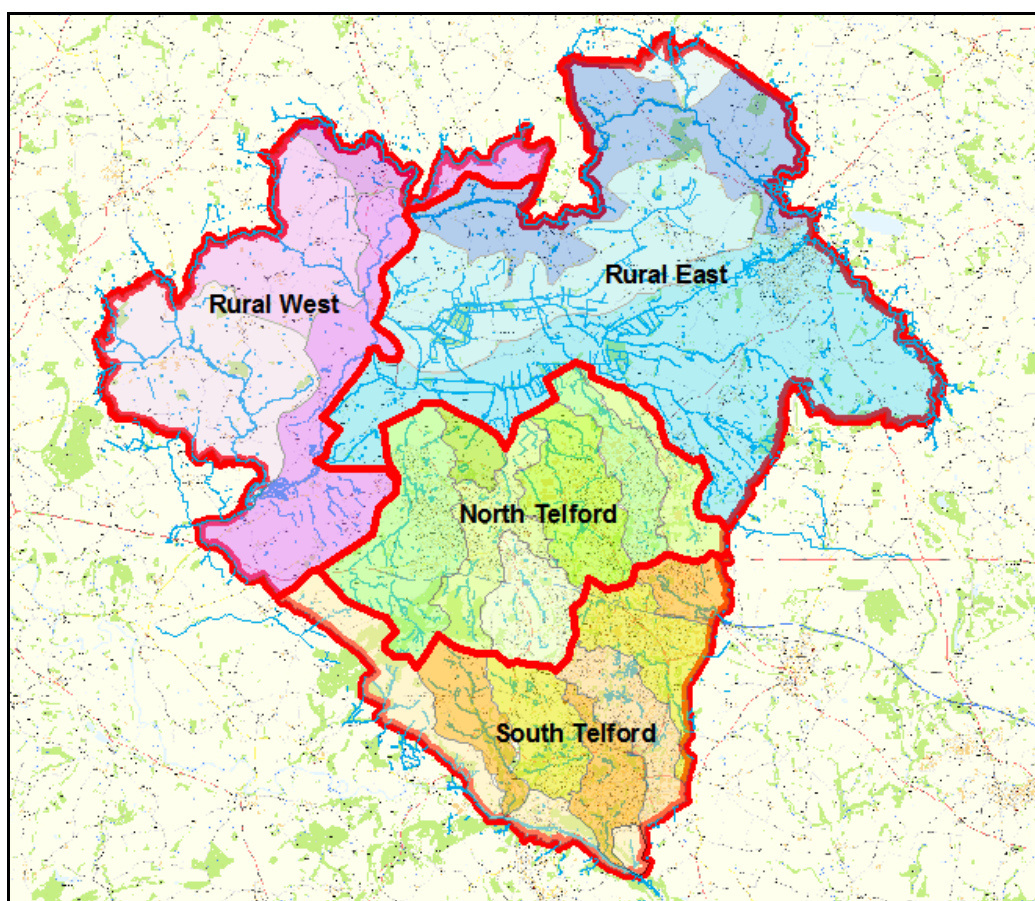


Figure 05 – Catchment Areas

A summary of the land use and topography of each catchment can be found below, and more detailed maps can be found in Appendix 1 A-D.

4.4 TELFORD NORTH

The North Telford catchment covers an area of 56.24km² (21.71miles²). Although predominantly urban it has a mixed land use, with rural areas to the South East and north, mixed residential through the centre and industrial to the North West. The Unit includes the areas of Wellington, Leegomery, Hadley, Hortonwood, Donnington, Oakengates, St Georges, and Ketley. The topography of the land falls from south to north and includes the Wrekin in the west and the Weald Moors in the north. All of the Telford North catchments discharge into the Rural East catchment.

4.5 TELFORD SOUTH

The South Telford catchment covers an area of 53.24km² (20.55miles²). The topography of the land generally falls to the south/south east and the majority of the land use within the Unit is urban, however there are large rural areas to the west. The Unit covers the areas of Priorslee, the Town Centre, Town Park, Hollinswood, Stafford Park, Randlay, Dawley, Stirchley, Brookside, Dawley, Halesfield, Sutton Hill, Madley, Woodside, Ironbridge, and the village of Little Wenlock.

4.6 RURAL WEST

The Rural West catchment area covers an area of 66.39Km² (25.63miles²). The topography of the land is relatively flat with a steady fall to the South. The land use in the catchment area is predominantly rural with a large amount of agriculture however it contains several areas of more dense population such as the villages of Crudgington, Waters Upton, Wrockwardine, High Ercall and parts of Admaston.

4.7 RURAL EAST

The Rural East catchment covers an area of 114.75Km² (44.3miles²). The land use in the unit is predominantly used for agriculture, and the majority of the area is sparsely populated. The unit includes the villages of Tibberton, Kinnersley, Lilleshall, Chetwynd Aston, and Edgemon, but also the town of Newport to the north east. This catchment receives additional flows from the Telford North catchment.

The topography of the land is very flat, especially around the Weald Moors which is has historically been drained by a gravity fed network of drainage ditches. This is now managed and maintained by the Strine IDB.

5. PROPERTIES AT RISK FROM FLUVIAL FLOODING

TWC holds Floodzone information for all main rivers and for some smaller watercourses within the Borough.



Figure 06 – Fluvial Flooding Surrounding Property in Coalbrookdale

5.1 BACKGROUND

Floodzone information for Main River was gathered as part of the 2007 SFRA Phase 1, and for five ordinary watercourses within the Borough as part for the SFRA Phase 2 which was completed in 2008. A further update to the Floodzone Mapping was provided by the EA in 2013 (version 201402).

For the purposes of this report the floodzone mapping produced as part of the SFRA Phase 2 will be used where available, with the updated National Floodzone Mapping used for Main River or where SFRA 2 maps are not available.

The mapping data is split into 2 Floodzone classifications:

- **Floodzone 2 - Medium Probability** - Land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%)
- **Floodzone 3a - High Probability** - Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%)

The SFRA Phase 2 mapping also includes a further Floodzone:

- **Floodzone 3b - The Functional Floodplain** - Land which would flood with an annual probability of 1 in 20 (5%) or greater in any year

By overlaying the Floodzone information on the Council's existing mapping and property point data, it is possible to assess the numbers of properties at risk of fluvial flooding in the Borough.

It should be noted however that in some cases this approach has resulted in some structures that have postcodes but are not occupied (such as pumping stations) have been included. Whilst these have been removed where possible all totals should be considered as approximate values.

The following sections outline the risk of fluvial flooding within each of the identified catchments:

5.2 TELFORD NORTH

The Telford North Catchment contained several ordinary watercourses which discharge into the Lower Strine catchment to the North. Several of the watercourses have SFRA Phase 2 data.

| Name of Catchment | River Classification | SFRA 2 | Number of Affected Properties | | |
|-------------------|----------------------|--------|-------------------------------|----------------------|-----------------|
| | | | Flood Zone 2 | Floodzone 3a | Floodzone 3b |
| Beanhill Brook | Ordinary Watercourse | Y | 170 (261 ¹) | 4 ¹ | - |
| Apley Catchment | Ordinary Watercourse | N | 2 ¹ | - | - |
| Hurley Brook | Ordinary Watercourse | Y | 44 (98 ³) | 32 (4 ³) | 130 |
| Ketley Brook | Ordinary Watercourse | Y | 36 | 1 | 2 |
| Crow Brook | Ordinary Watercourse | Y | 22 | 20 | 21 |
| Humber Brook | Ordinary Watercourse | N | 32 (6 ²) | 6 ² | 27 ² |
| Wall Brook | Ordinary Watercourse | Y | 39 | 39 | 124 |
| Total | | | 667 | 106 | 304 |

¹ Properties affected by Hurly Brook ² Properties affected by Wall Brook ³ Properties affected by Wall Brook

Table 01 – Telford North Fluvial Affected Properties

170 properties have been identified in Bratton as being located in Floodzone 2 in the Beanhill Brook catchment. Many of these properties are located around the large diameter STW culvert that conveys flows from the Beanhill Brook away from its original channel to a large trapezoidal modified channel to the west of Bratton Hall Farm. The modelling would not have taken this feature into account therefore it is likely that in reality the risk of flooding in this location is significantly lower than predicted. The modelling has however highlighted the importance of keeping the inlet grille clear of debris.



Figure 07 – Grille Maintenance at Bratton

In addition to the flooding from the brook itself, a total of 265 properties have been identified as at risk of flooding in the Beanhill Brook catchment from flooding from the Hurley Brook.

The flood risk associated with the Hurley Brook is well known with large areas of eastern Wellington potentially at risk. The watercourse receives flows from Limekiln woods and the Wrekin before being culverted under the M54. The Brook has been heavily modified and is culverted through large stretches of Wellington.

The modelling of the Hurley Brook shows that during a flood event overland flows will build up against, and then flow along the main Telford to Birmingham rail line. These flows will affect Wellington Station (as shown in Figure 17 in Section 10), and 265 properties in the Beanhill Brook catchment.



Figure 08 – Flooding from the Hurley Brook in Wellington during 2007

Properties are also at risk of flooding from the Ketley Brook. The brook includes Ketley Sands flood meadow which is a STW asset. The flood meadow holds approximately 156,500m³ of water during storm events and protects large numbers of properties in Hadley and Leegomery. The Ketley Brook discharges into the Hurley Brook downstream of Ketley Sands via the public sewer network. As a result properties in the Hurley Brook catchment are at risk of flooding from the Ketley Brook.

Flooding from the Crow Brook has been identified around Trench and Middle pools. Around 60 properties have been identified at risk in this area along with significant flooding of Trench Lock interchange. Should flooding from the crow brook occur there would be significant disruption to the highway network in north Telford.

A large number of properties located in Muxton and the Humbers have been identified as at risk in the Wall Brook catchment. As with all of the urban watercourses the Wall Brook has been heavily modified. The floodzone appears to be associated with a series of culverts and open channels areas of open space and gardens in the area. This floodzone will potentially impact on the A518 Telford to Newport road. Flooding from the Wall brook also affects properties in the Humber Brook catchment.

5.3 TELFORD SOUTH

The Telford South Catchment contains River Severn and the Coal Brook which are classified as Main River. The River Severn is the receiving waterbody for all of the other ordinary watercourses. Two of the ordinary watercourses have SFRA Phase 2 data.

| Name of Catchment | River Classification | SFRA 2 | Number of Affected Properties | | |
|--------------------|----------------------|--------|-------------------------------|--------------|--------------|
| | | | Flood Zone 2 | Floodzone 3a | Floodzone 3b |
| Severn Catchment | Main River | N | 46 | 61 | - |
| Loamhole Brook | Ordinary Watercourse | N | - | - | - |
| Lightmoor Brook | Ordinary Watercourse | N | 5 | 10 | - |
| Coal Brook | Main River | N | 22 | 57 | - |
| Blists Hill | Ordinary Watercourse | N | - | - | - |
| Madd Brook | Ordinary Watercourse | Y | 46 | 2 | 12 |
| Nedge Hill Brook | Ordinary Watercourse | Y | - | - | - |
| Wesley Brook | Ordinary Watercourse | N | - | - | - |
| Coalport Catchment | Ordinary Watercourse | N | - | - | - |
| Total | | | 119 | 130 | 12 |

Table 02 – Telford South Fluvial Affected Properties

A large percentage of the properties located in all floodzones in the Telford South catchment are associated with the River Severn. At present 7 businesses and 25 residential properties are protected from flooding by the Ironbridge Temporary Flood Barriers (further information on the barriers can be found in Section 16), however a significantly greater number of properties are unprotected by any formal flood defence structure and are still at risk.



Figure 09 – Flooding from the River Severn at the Boat Inn at Jackfield

Due to the speed and severity of the flooding associated with the Coal Brook it has been designated a Rapid Response Catchment by the EA. In order to fully understand the risk of flooding in this location and to set out a multi-agency response to the flooding TWC has created a Rapid Response Catchment Plan for Coalbrookdale.

Approximately 11 properties/businesses located at the bottom of Dale End that are within the Coal Brook catchment are also at risk of flooding from the River Severn.

Whilst no properties in the Borough are shown to be at risk of fluvial flooding from the Wesley Brook, there are known significant flooding issues in Shifnal which is located outside the Borough boundary in Shropshire downstream of Priorslee Balancing Reservoir. During the 2007 event a large number of properties in Shifnal were internally flooded as a result of the excessive rainfall.

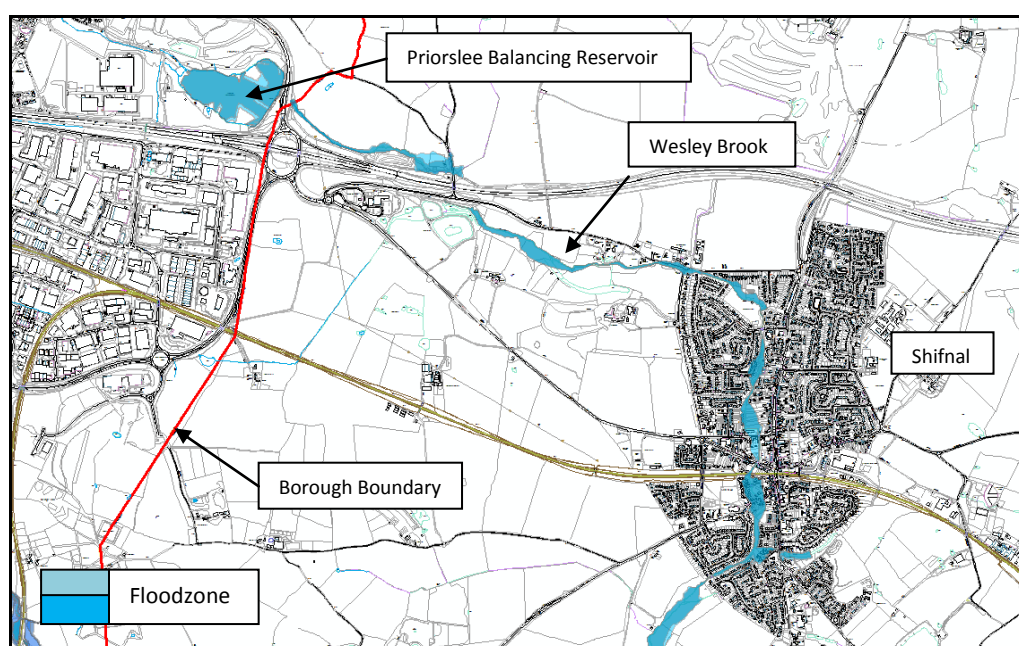


Figure 10 – Flood Risk from the Wesley Brook

Shropshire Council have undertaken several pieces of work to understand this flooding and have created a Surface Water Management Plan for Shifnal. This can be found on the Shropshire Council Website:

<https://www.shropshire.gov.uk/environmental-maintenance/drainage-and-flooding/surface-water-management-plans/shifnal-surface-water-management-plan/>

Whilst a large part of the Wesley Brook catchment is outside the Borough, it is essential that any development within the Borough in this catchment is properly managed.

Telford and Wrekin Council will therefore work in partnership with Shropshire Council to ensure that any development in this catchment is properly managed so that the flood risk in Shifnal is considered. As the Wesley Brook also becomes Main River after discharging from Priorslee Balancing Reservoir it is also important that the EA is also involved in any decision making.

Properties have been identified as at risk in the Mad Brook Catchment. This catchment includes Telford Town Park, but also Randlay Pool which is a STW balancing reservoir. Randlay Pool receives flows from the public sewer network serving large parts of the town centre and the M54 (located in the Nedge Hill Brook catchment). A large portion of these flows remain within the public sewer network until they discharge into Holmer Lake. As this large diameter sewer network has not been taken into account in the modelling it is unlikely that many of these properties will actually be at risk. However should this system fail, or if a blockage occurred these properties would then be put at risk and have therefore been included.

In addition to the properties a large number of industrial units in Halesfield have been identified as at risk in the lower part of the Mad Brook catchment downstream of Holmer Lake which is also a STW balancing reservoir. The reservoir has a large control structure which will regulate the rate of downstream flow during normal conditions. However, during periods of heavy rainfall the structure is designed to overtop and allow increased rates of flow downstream into a flood meadow in Halesfield.

As with the properties in the upper catchment, a large diameter sewer system would normally convey flows to the outfall on the Borough boundary, however any failure or blockage would still result in this flooding.



Figure 11 – Holmer Lake Control Structure

5.4 RURAL EAST

No SFRA Phase 2 modelling is available for the Rural East Catchment. All properties identified as at risk are located in floodzone 2.

The flood risk to properties from fluvial flooding in the Rural East catchment is low. Due to the sparse population density there are few properties that have been identified as at risk of fluvial flooding. The majority of the properties are associated with the Lower Strine catchment which includes the town of Newport and the village of Lilleshall.

| Name of Catchment | River Classification | SFRA 2 | Number of Affected Properties | | |
|-------------------|----------------------|--------|-------------------------------|--------------|--------------|
| | | | Flood Zone 2 | Floodzone 3a | Floodzone 3b |
| River Meese | Main River | N | 5 | 1 | - |
| Upper Strine | Main River | N | 4 | 3 | - |
| Lower Strine | Main River | N | 6 | 33 | - |
| Sam Brook | Ordinary Watercourse | N | - | 1 | - |
| Total | | | 16 | 38 | - |

Table 03 – Rural East Fluvial Affected Properties

The majority of the properties at risk in the Lower Strine catchment are located in Newport, and are associated with Floodzone 3 of the River Strine. These properties are located adjacent to the river, and although shown to be within Floodzone 3 are not known to flood on a regular basis.

A total of 7 properties have been identified as at risk in Lilleshall. All of these properties are associated with Honnington Brook that runs along the southern boundary of the village. These properties are also known to have been previously affected by overland flows from the public highway as a result of the steep gradient in the area.

| Catchment Name | Floodzone 2 (ha) | Floodzone 3 (ha) |
|----------------|------------------|------------------|
| River Meese | 101 | 90 |
| Upper Strine | 380 | 263 |
| Lower Strine | 704 | 498 |
| Sam Brook | 16 | 14 |

Table 04 – Rural East Floodzone Area

Whilst the number of properties shown to be at risk of flooding in the Rural East Catchment is lower than the more urban parts of the Borough, a significant amount of productive farmland is shown to be at risk of flooding from both main river and ordinary watercourses.

A particularly large area of both the Upper and Lower Strine Catchments is shown to be at risk of fluvial flooding, the large majority which is managed by the Strine IDB.

TWC are aware of the implications of flooded farmland on both individual farmers and the rural economy. Further information on how TWC will deal with locally significant flooding of farmland can be found in Section 10.3

5.5 RURAL WEST

No SFRA Phase 2 modelling is available for the Rural West Catchment.

As with the Rural East catchment the sparse population density and lack of more detailed modelling has resulted in few properties being identified as at risk of fluvial flooding.

The properties that have been identified are all buildings such as mills or other agricultural installations that would have historically relied on being close to a river or watercourse.

| Name of Catchment | River Classification | SFRA 2 | Number of Affected Properties | | |
|-------------------|----------------------|--------|-------------------------------|--------------|--------------|
| | | | Flood Zone 2 | Floodzone 3a | Floodzone 3b |
| River Roden | Main River | N | 2 | 0 | - |
| River Tern | Main River | N | 1 | 4 | - |
| Lakemoor Brook | Ordinary Watercourse | N | 0 | 3 | - |
| Total | | | 2 | 15 | - |

Table 05 – Rural West Fluvial Affected Properties

A large area of rural farmland is also shown to be at risk of flooding in the Rural West Catchment as shown in Table 06 below. The majority of which is associated with the River Tern which runs a distance of approx 15km though the Borough.

| Catchment Name | Floodzone 2 (ha) | Floodzone 3 (ha) |
|----------------|------------------|------------------|
| River Roden | 89 | 69 |
| River Tern | 198 | 175 |
| Lakemoor Brook | 59 | 43 |
| Platt Brook | 12 | 10 |

Table 06 - Rural West Floodzone Area

5.6 OVERALL FLUVIAL FLOOD RISK

Table 07 below shows the total number of properties at risk of fluvial flooding in the Borough.

| Catchment | Number of Affected Properties | | |
|---------------|-------------------------------|--------------|--------------|
| | Flood Zone 2 | Floodzone 3a | Floodzone 3b |
| Telford North | 667 | 106 | 304 |
| Telford South | 119 | 130 | 12 |
| Rural East | 16 | 38 | - |
| Rural West | 3 | 7 | - |
| Total | 805 | 281 | 316 |

Table 07 – Total Fluvial Affected Properties

It is clear that there is a direct correlation between the numbers of affected properties and the increased urbanisation of the Telford North and South catchments.

Whilst the population density is higher than the more rural catchments, the increased detail of flood mapping available may have also result in the better identification of properties in catchments where this is available. It has also been identified that a flood event in some catchments may put properties in neighbouring catchments at risk.

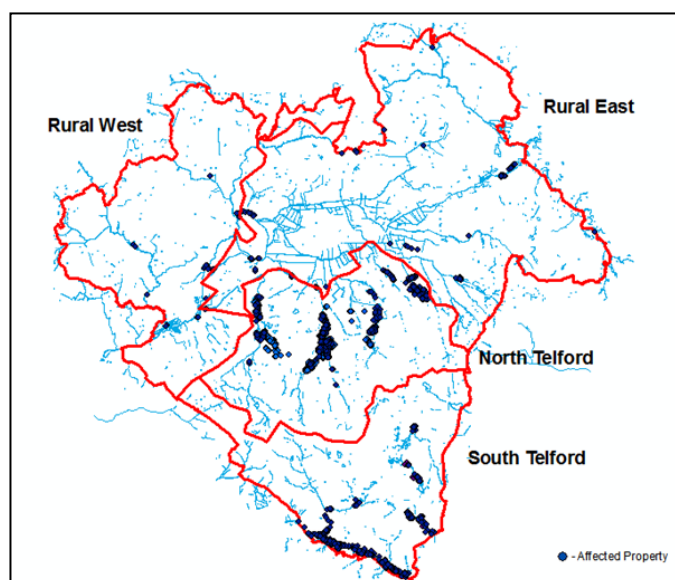


Figure 12 – Fluvial Property Flooding

The work done to identify properties at risk from fluvial flooding will be an important tool in identifying areas where potential flood defence schemes may be possible and will now be used as further justification for future funding applications to Flood Defence Grant in Aid (FDGiA) and other sources of funding. Further information on FDGiA bids can be found in Section 13.

Whilst there are a large number of properties located in Floodzone 2 in the Borough the risk of these properties being affected is low (1% – 0.1% of flooding). For this reason TWC will where possible concentrate available resources on properties located in Floodzones, 3a (>1% of flooding) and 3b (<5% of flooding).

In order to raise awareness of the risks of flooding TWC will where appropriate contact properties and businesses that have been identified as being in Floodzone 3a or 3b to discuss possible impacts of flood events, flood resilience, and identify possible projects to reduce overall flood risk.

Although several of the small urban catchments have benefited from the increased accuracy of the SFRA Phase 2 data, many have no or limited flood mapping. Due to the small size and increased areas of hardstanding it is likely that these catchments will be come more susceptible to fluvial flooding during intense rainfall events in the future.

The urban catchments will also accommodate the majority of the projected future growth within the Borough therefore it is essential that TWC are able to accurately identify existing and future fluvial flood risk so that development can be appropriately managed. For this reason TWC will aim to undertake additional modelling on ordinary watercourses that do not already benefit from SFRA Phase 2 data where the greatest number of properties can be identified and therefore protected.

6. PROPERTIES AT RISK FROM PLUVIAL FLOODING

Pluvial flooding is defined as flooding as a result of rainfall-generated overland flow, before the runoff enters any watercourse or sewer. Pluvial flooding is usually associated with extreme rainfall events, however in some locations it may occur during smaller events due to low permeability, the surrounding topography, or where rainfall is unable to enter a surface water carrier due to issues with capacity.

6.1 BACKGROUND

The Telford and Wrekin PFRA has identified the updated Flood Map for Surface Water (uFMfSW) as the Locally Agreed Surface Water Information for the Borough, therefore this information has been used for the assessment. The uFMfSW has modelled three rainfall events:

- **High Risk:** 1 in 30 chance of occurring in a year
- **Medium Risk:** 1 in 100 chance of occurring in a year
- **Low Risk:** 1 in 1000 chance of occurring in a year



Figure 13 – Pluvial Flooding of properties at Ketley Town

As with the Floodzone mapping, by overlaying the uFMfSW on the Council's existing mapping and property point data, it is possible to assess the numbers of properties at risk of fluvial flooding in the Borough.

It should be noted however that in some cases this approach has resulted in some structures that have postcodes but are not occupied (such as pumping stations) have been included. Whilst these have been removed where possible all totals should be considered as approximate values.

6.2 RESULTS

| North Telford | Number of Affected Properties | |
|-------------------|-------------------------------|-------------|
| Name of Catchment | 1 in 30 | 1 in 100 |
| Beanhill Brook | 173 | 299 |
| Apley Catchment | 2 | 0 |
| Hurley Brook | 140 | 214 |
| Ketley Brook | 98 | 172 |
| Crow Brook | 205 | 315 |
| Humber Brook | 110 | 299 |
| Wall Brook | 14 | 57 |
| Total | 742 | 1356 |

Table 08 – Properties at Risk of Pluvial Flooding in North Telford Catchment

| South Telford | Number of Affected Properties | |
|-------------------|-------------------------------|-------------|
| Name of Catchment | 1 in 30 | 1 in 100 |
| Severn Catchment | 28 | 42 |
| Loamhole Brook | 1 | 2 |
| Lightmoor Brook | 122 | 131 |
| Coal Brook | 23 | 11 |
| Blists Hill | 152 | 254 |
| Mad Brook | 112 | 297 |
| Nedge Hill Brook | 270 | 213 |
| Wesley Brook | 54 | 74 |
| Total | 762 | 1024 |

Table 09 – Properties at Risk of Pluvial Flooding in South Telford Catchment

| Rural West | Number of Affected Properties | |
|-------------------|-------------------------------|-----------|
| Name of Catchment | 1 in 30 | 1 in 100 |
| River Roden | 2 | 5 |
| River Tern | 19 | 19 |
| Lakemoor Brook | 5 | 5 |
| Total | 26 | 29 |

Table 10 – Properties at Risk of Pluvial Flooding in Rural West Catchment

| Rural East | Number of Affected Properties | |
|-------------------|-------------------------------|------------|
| Name of Catchment | 1 in 30 | 1 in 100 |
| River Meese | 7 | 14 |
| Upper Strine | 5 | 7 |
| Lower Strine | 50 | 187 |
| Sam Brook | 1 | 2 |
| Total | 63 | 210 |

Table 11 – Properties at Risk of Pluvial Flooding in Rural East Catchment

6.3 OVERALL PLUVIAL FLOOD RISK

Figure 14 shows the number of properties affected by pluvial flooding per 500m² grid square.

It is clear that the number of affected properties is greater in the more urbanised areas of Telford which are covered by the Telford north and South Catchments. There is also a cluster of affected properties in the Rural East Catchment around the town of Newport.

The total number of affected properties in each catchment and the Borough can be found in Table 12 below.

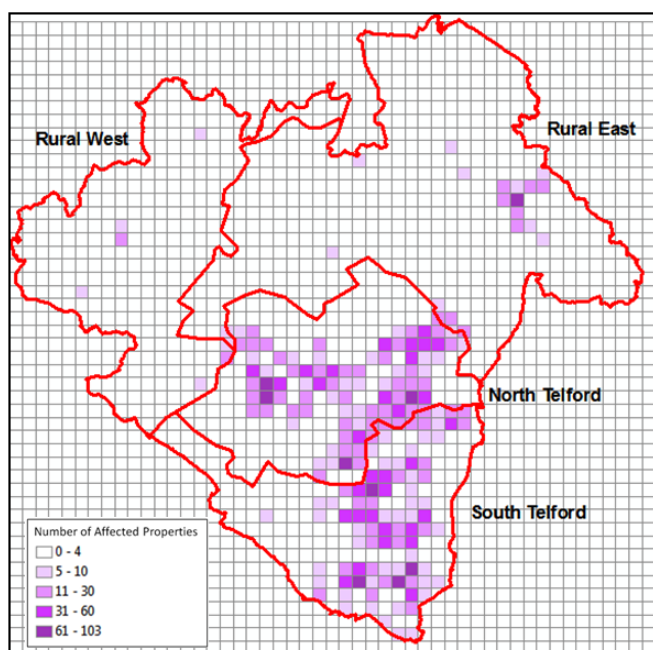


Figure 14 – 500m² Grid Pluvial Flooding

| Total Risk | Number of Affected Properties | |
|-------------------|-------------------------------|-------------|
| Name of Catchment | 1 in 30 | 1 in 100 |
| North Telford | 742 | 1356 |
| South Telford | 762 | 1024 |
| Rural west | 26 | 29 |
| Rural East | 63 | 210 |
| Total | 1593 | 2619 |

Table 12 – Total Number of Properties at Risk of Pluvial Flooding in the Borough

The work done to identify properties at risk from pluvial flooding will also be an important tool in identifying areas where potential flood defence schemes may be possible and will now be used as further justification for future funding applications to FDGiA and other sources of funding. Further information on FDGiA bids can be found in Section 13.

6.4 PLUVIAL FLOODING INVESTIGATIONS

The 500m² grid squares have been further enhanced by reducing the search area to 250m². This approach has allowed for the identification of clusters of properties in the Borough that have the highest possibility of being affected by existing or future pluvial flooding. As the 1 in 30 map represents the properties most at risk, this data set will be used for all future investigations.

Although these properties have been identified as at risk, many of the areas are not known to flood regularly. The FMfSW is limited in that it is capable of identifying properties at risk, but it can not identify drainage systems that may be providing protection.

For this reason where more than **20** properties are affected within a **250m²** grid square during the **1 in 30 Year Event**, or where more than **10** properties are affected in adjacent grid squares, TWC will investigate the potential for flooding in the area.

This investigation will identify possible sources/causes of flooding, but also any drainage infrastructure protecting the properties. Where relevant these systems/structures will be added to the Flood Risk Asset Register as set out in Section 12 of this report. Where possible the recommendations of these reports will include recommendations on the future maintenance of these features (such as the inclusion of highway gullies on the priority list).

This approach will aim to pre-empt possible flood events and ensure that the ownership, condition, and functionality of any critical infrastructure is identified prior to failure.

7. PROPERTIES AT RISK FROM RESERVOIR INUNDATION

There are several large raised reservoirs located in within the Borough. Many of these features are a result of the Boroughs industrial past and now provide both amenity space and wetland habitat, but some were constructed as part of the creation of the new town to form a balancing feature for the surface water sewerage network.



Figure 15 – Priorslee Balancing Reservoir located off M54 Junction 4

Although the likelihood of a catastrophic embankment failure at any of the large raised reservoirs in Telford is extremely unlikely, should a dam breach occur the potential impact on surrounding properties would be significant.

7.1 RESERVOIR REGULATION

Any raised reservoir capable of holding over 25,000m³ must be properly managed under the Reservoirs Act (1975). The act requires the owners of each reservoir to regularly inspect the embankments and surrounding land to identify possible defects or damage that may lead to embankment failure.

A list of the reservoirs in the Borough that are currently covered by the act can be found in table 13 below. This table also includes details on the height, capacity, ownership, and number of properties at risk should a catastrophic embankment failure occur.

The properties identified a risk in Table 11 are those within the EA Risk of Flooding from Reservoirs dataset. This mapping is based on the catastrophic failure of the reservoir and therefore represents the worst case scenario of a complete dam failure. Whilst flooding from this would be significant, the chances of this occurring are extremely low.

| Reservoir | Dam Height (m) | Capacity (m ³) | Owner | Properties at Risk |
|-------------------------------------|----------------|----------------------------|-------|--------------------|
| Apley Pool | 3 | 68,000 | TWC | 0 |
| Holmer Lake | 8.2 | 90,900 | STW | 43 |
| Horsehay Pool | 6 | 25,000 | TWC | 345 |
| Ketley Sands | 10.5 | 148,000 | STW | 1000 |
| Middle Pool | 5 | 54,800 | STW | 497 |
| Priorslee Balancing Reservoir | 11 | 196,000 | STW | Approx 397* |
| Priorslee Flash | 5 | 25,000 | TWC | 91 |
| Trench Pool | 4 | 92,360 | CRT | 465 |
| Withy Pool | 4.5 | 25,000 | TWC | 1 |

*All properties at risk outside TWC boundary

Table 13 – Large Raised Reservoirs

Under the act the owner of each reservoir is required to undertake weekly inspections, and to arrange a yearly inspection by an independent Supervising Engineer. A 10 yearly report by an independent Inspecting Engineer is also required. This multi level inspection of each reservoir means that whilst the consequences of dam failure may be high, the risk of it occurring is very low.

Whilst not a requirement of the act, the owner of a reservoir should create an On Site Plan to set out emergency draw down procedures should the emptying of the reservoir be required.

In addition to the On Site plans, TWC Civil Resilience Team are currently preparing Off Site Plans for all of the large raised reservoirs in the Borough. These plans will use the information contained in the On Site plans along with the inundation mapping provided by the EA to identify properties most at risk, and outline the most appropriate response a breach event.

7.2 ALTERATIONS TO THE RESERVOIRS ACT

The Flood and Water Management Act (2010) updates the Reservoirs Act (1975) and reflects a more risk-based approach to reservoir regulation. Some of the changes include:

- Large raised reservoirs that are assessed as 'high risk' will be subject to full regulation
- Large raised reservoirs that are not assessed as 'high-risk' will need to be registered but will not be subject to full regulation
- All incidents at reservoirs must be reported
- Reservoirs that hold more than 10,000 (subject to Ministers agreement) cubic meters of water may be registered in future
- If registered, some reservoirs that hold more than 10,000 (subject to Ministers agreement) cubic meters of water that are assessed as 'high-risk' will be subject to full regulation.

Further information about the areas within the Borough that could be affected by a reservoir failure can be found in the ['What's in Your Backyard'](#) section of the Environment Agency's website.

8. PROPERTIES AT RISK OF GROUNDWATER FLOODING

Groundwater flooding usually occurs in low lying areas during periods of sustained heavy rainfall. During these periods rain infiltrates into the underlying rocks and strata raising the water table above the level of the surrounding ground. There can be substantial time-lags between the persistent or heavy rainfall events and flooding resulting from the emergence of groundwater. This is due to the relatively slow rate at which water percolates into and moves through permeable strata.

Although groundwater flooding is generally less hazardous to human health than surface flooding, it is more hazardous to property for a given flood depth, producing 2 to 4 times the damage to building fabric and greater disruption to economic activity due to the longer duration of flood events.

Whilst flooding from groundwater is not common in the Borough, some areas are known to be affected by a high water table. During the prolonged winter rainfall of 2013/14 some flooding was experienced from wells and other groundwater fed features.

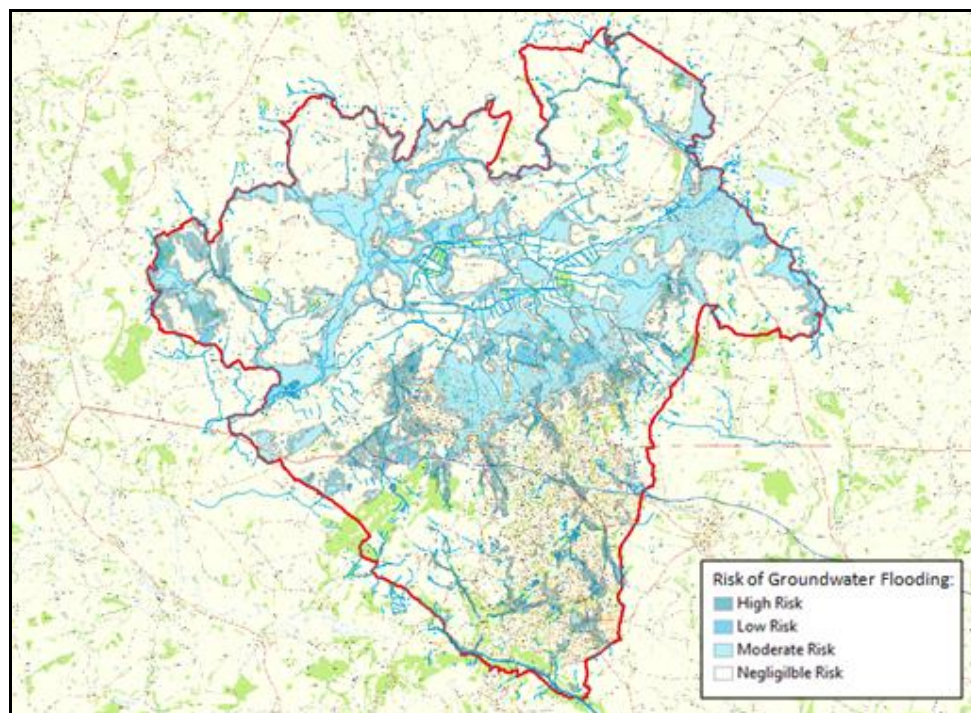


Figure 16 – Areas Susceptible to Groundwater Flooding

At present, our understanding of the risk of groundwater flooding is limited. TWC are currently working with partner organisations and external consultants to gain a better understanding of the risk of groundwater flooding in the Borough.

9. FUTURE CLIMATE CHANGE

Future climate change has the potential to severely impact the functionality of drainage systems. Drainage networks that had previously been capable of dealing with the majority of rainfall events now no longer have the capacity to deal with the frequency and intensity of recent storm events. It is therefore essential that future climate change is taken into account in the design of new developments and during flood alleviation projects.

9.1 NATIONAL CLIMATE CHANGE PREDICTIONS

The impact of climate change on local flood risk is relatively poorly understood. Several national flood maps have informed the preliminary assessment report - specifically the Flood Map for Surface Water (surface runoff), Areas Susceptible to Surface Water Flooding (surface runoff), Areas Susceptible to Groundwater Flooding (groundwater) and Flood Map (ordinary watercourses). These do not show the impact of climate change on local flood risk.

There was consensus amongst climate model projections presented in the IPCC fourth assessment report for northern Europe suggesting that in winter high extremes of precipitation are very likely to increase in magnitude and frequency. These models project drier summers with increased chance of intense precipitation — intense heavy downpours interspersed with longer, relatively dry periods (Solomon et al., 2007).

9.1.1 UKCP09

United Kingdom Climate Projections 2009 (UKCP09) provides the most up to date projections of future climate for the UK:

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

In terms of precipitation, the key findings are:

By the 2080s, under Medium emissions, over most of lowland UK

- Central estimates are for heavy rain days (rainfall greater than 25 mm) to increase by a factor of between 2 and 3.5 in winter, and 1 to 2 in summer.

By the 2080s, under Medium emissions, across regions in England & Wales

- The central estimate (50% probability) for winter mean precipitation % change ranges from +14 to +23
- Central estimate for summer mean precipitation % change ranges from -18 to -24.

Certain key processes such as localised convective rainfall are not represented within this modelling so there is still considerable uncertainty about rarer extreme rainfall events for the UK. We can be more certain that heavy rainfall will intensify in winter compared to summer. The proportion of summertime rainfall falling as heavy downpours may increase. The impact of these changes on local flood risk is not yet known.

9.1.2 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, increases in precipitation intensity of 40% or more by the 2080s are plausible across the UK at the local scale.

9.1.3 APPROPRIATE DEVELOPMENT

In England, the National Planning Policy Framework (NPPF) aims to "ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall."

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), but should be recorded here so that they can be reviewed in the future.

9.2 LOCAL CLIMATE CHANGE PREDICTIONS

Utilising the 2009 UK Climate Projections, it is possible to understand how the local climate in Telford and Wrekin is likely to change over the next century compared to the 1961-1990 baseline. Rather than attempting to predict the actual change between now and a date in the future, the projections are displayed by probability which allows for more flexibility when analysing the data.

The projections (assuming the medium future carbon emissions scenario) show that there is unlikely to be any significant change to the amount of precipitation that the Telford and Wrekin area receives annually between now and the 2080's. However there is likely to be a dramatic change to when that rainfall occurs, with a likely increase in winter precipitation of 18.5% compared to today but could be as much as 41% in the extreme.

This would be mirrored by a similar decrease in precipitation levels during the summer months. In addition, severe weather will become more intense, with the wettest day of winter experiencing a considerable increase in rainfall intensity, with a median estimated increase of 18.8% but as much as 39% at the extreme. The projections displayed are a comparison against the 1961-1990 baseline climate as summarised below:

Telford & Wrekin's baseline climate 1961-1990

Rainfall

- **Average daily rainfall in winter** was 1.87mm
- **Average daily rainfall in summer** was 1.73mm

Telford & Wrekin in the 2020's

Rainfall

- **Mean winter precipitation** is likely to **increase** by 5.4% but could be as much as 15.8%
- **Mean summer precipitation** is expected to **decrease** by 6.0% but possibly by as much as 21.0%
- **Precipitation on the wettest day of winter** is estimated to **increase** by 5.2% but could be as much as 17.9%

Telford & Wrekin in the 2050's

Rainfall

- **Mean winter precipitation** is likely to **increase** by 13.7% but could be as much as 29.5%
- **Mean summer precipitation** is expected to **decrease** by 15.0% but possibly by as much as 33.6%
- **Precipitation on the wettest day of winter** is estimated to **increase** by 13.2% but could be as much as 29.5%

Telford & Wrekin in the 2080's

Rainfall

- **Mean winter precipitation** is likely to **increase** by 18.5% but could be as much as 41.3%
- **Mean summer precipitation** is expected to **decrease** by 18.5% but possibly by as much as 40.1%
- **Precipitation on the wettest day of winter** is estimated to **increase** by 18.8% but could be as much as 39.2%

10. LEVEL OF SIGNIFICANT FLOODING IN THE BOROUGH OF TELFORD AND WREKIN

Flood risk within Telford and Wrekin comes from a number of different sources and is extremely varied and widespread across the Borough. It is not technically or financially possible to eliminate every flooding issue, therefore it is important to take a risk-based approach and prioritise the areas that are at greatest risk, and that will provide the most benefit from flood risk management work.

The Borough covers both a densely populated urban environment in the main Telford conurbation, but also a sparsely populated rural area in the north. The level of local significant flooding must therefore reflect both of these areas in terms of the impact of a flood event on both a rural community, and a more urbanised environment.

10.1 LEVEL OF SIGNIFICANT FLOODING

A flood is deemed significant to TWC if it:

- Causes internal flooding to 3 or more residential properties, or
- Causes internal flooding to 2 or more business premises, or
- Flooded one or more items of critical infrastructure, or
- Caused a transport link to be totally impassable for a significant period.

The definition of “significant period” is dependant on the transport link affected as follows (Highway categories are as set out in Table 1 of the UKRLG Code of Practice for Highway Maintenance).

- Category 1 highways (motorways) and major rail links – 2 hours or more
- Category 2 and 3a highways and other railway links – 4 hours or more
- Category 3b and 4a highways – 10 hours or more
- Category 4b highways – 24 hours or more



**Figure 17 – Flooding at Wellington Station from the Hurley Brook
Summer 2007**

The criterion for identifying Nationally Significant Flooding is based on the number of properties affected a 1K grid system which is suitable for identifying flood risk on a national scale. For the purposes of identifying Locally Significant Flood Risk Areas, the above criteria will applied to a 250m² grid which will allow the identification of local risk in greater detail.

10.2 REASONING

The reasoning behind these criteria is as follows:

- The level of three properties experiencing internal flooding has been chosen as the Borough of TWC covers both rural and urban areas, the level of 3 properties experiencing internal flooding would have a both a significant adverse affect on a rural community, and also cause significant damage in an urban setting.
- The number of business premises has not been reduced beyond two (the order of magnitude suggested by the EA), as this would have reduced the threshold to 1, which could result in very isolated, minor flooding being considered significant.
- The 2-hour period for closure of a motorway or a major railway link is based on a figure suggested by a Highways Agency representative for all parts of the trunk road and motorway network.
- The 4-hour period for closure of a category 2 or 3a highway or other railway link equates to an event affecting one peak period in a working day. (08.00 to 18.00)
- The 10-hour period for closure of a category 3b or 4a highway equates to an event affecting both peak periods in a working day. (08.00 to 18.00)

- The 24-hour period for closure of a category 4b highway equates to an event cutting off small numbers of properties and impacting some rural businesses.
- The difference between major and other rail links has not been specified to avoid being too prescriptive. It is likely that major rail links will have twin tracks carrying several trains per hour in each direction, a number of which will be “through trains” (not stopping at minor stations).



Figure 18 – Flooding of the M54 after breach of a Quarry Bund

10.3 LOCALLY SIGNIFICANT FLOODING TO FARMLAND

The level of significant flooding as set out in Section 10.1 above is mainly focused on the flooding of properties and other critical infrastructure. Whilst this approach will ensure that the most serious residential, commercial and transport flooding is correctly investigated, the impact of rapid or prolonged flooding of large areas of productive farmland also has the potential to affect both individual farming businesses and the wider rural economy.

Nationally about 50,000ha of agricultural land was flooding during the winter of 2013-14, but it is still too early to assess the financial cost to farming. In 2007 42,000ha of farmland flooded in June and July. The total agricultural loss amounted to £50 million, only five per cent of which was covered by insurance.

Although TWC is often seen as an urban authority, approximately 62% of the Borough is composed of rural countryside. For this reason it is important that any flooding that occurs (above what would be considered the natural flooding from rivers and ordinary watercourses) is also classified as significant and formally investigated.

Whilst it is easy to quantify the cost of flooding to properties there are many more variables when assessing the impact of flooding to farmland. The type of crop, the duration of the flood event, the time of year when the flooding

occurs, and even the damage caused by previous adverse weather conditions can have an impact on the cost of each flood event.

As farmland is often located downstream of more urban areas where there may be several contributing factors it can difficult to identify a definitive cause of each flood event.

10.3.1 THRESHOLD FOR INVESTIGATION

The majority of rural land owners have owned and farmed their land for a significant amount of time. They will have a good idea of what areas are flooded annually and will manage their land in such a way that high value crops are located in areas that are least likely to be affected.

For this reason should flooding occur that an agricultural land owner considers greater than what would normally be expected during a single extreme rainfall event, or when a land owner feels that the actions of another landowner or organisation have resulted in increased flooding of farmland, they can report this to the Telford Rural Flooding Assessment Board.



Figure 19 – Flooded Farmland in Strine Catchment 2007

This board is made up of a representative from the LLFA, EA, National Farmers Union (NFU) and the Strine IDB (if flooding has occurred in an IDB controlled area). When a flood event is reported the board will meet with the land owner to discuss the possible causes, extent, and damaged caused by the flood. The board will then consider the need for a formal investigation as set out in Section 11.2

It should be noted however that due to the nature of rural flooding it may not always be possible to accurately identify a definitive cause of an event especially after prolonged periods of heavy rainfall. On these occasions a the Flood Investigation Report will be used as a record of the event and as an evidence base for better understanding of rural flood risk.

Should a landowner wish to report a rural flooding event they can contact the Local Flood Risk Officer via flood@telford.gov.uk.

11. DUTY TO INVESTIGATE LOCALLY SIGNIFICANT FLOOD EVENTS

Under Section 19 of the Flood and Water Management Act, each Lead Local Flood Authority (LLFA) has a duty to investigate flood incidents within its area of responsibility:

SECTION 19 - LOCAL AUTHORITIES: INVESTIGATIONS

1. On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate:
 - a) which risk management authorities have relevant flood risk management functions, and
 - b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.
2. Where an authority carries out an investigation under subsection (1) it must:
 - a) publish the results of its investigation, and
 - b) notify any relevant risk management authorities.

While the management responsibility for a flood may be clear in many cases, there may be occasions where this is not so and the purpose of this provision is to require the LLFA to investigate where appropriate, so as to try and ascertain where responsibility for managing the flood risk lies and what is being done about it. The LLFA must publish the results of any investigation and notify any relevant risk management authority of those results.

11.1 THRESHOLD FOR INVESTIGATION

It is essential that the resources committed to the investigation of flood events are appropriate in relation to the severity of each event, and the risk of reoccurrence. For that reason TWC will only formally investigate flood events if one of the following criteria is met:

- (a) **Locally significant flooding** - Any event that has been deemed Locally Significant as outlined in Section 10.
- (b) **The frequency of flooding in a given location** – Where flooding has occurred more than once in a five year period, or where internal flooding of one or more property occurs in a “new build” property built after the publication for the TWC SFRA in 2008.
- (c) **Depth, area or velocity of flooding** - An event where threat to life and/or threat of injury or harm has occurred. A request from the emergency services, particularly Shropshire Fire and Rescue Service, will be formally referred to the Strategic Flood Board for a decision.
- (d) **Demographic nature of flooded communities** - An event which affects an area or community with a concentration or high proportion of vulnerable people e.g. an area of social housing for older people. Consultations with Social Care Departments, Community Health Services and the voluntary sector will be key in establishing a community profile.
- (e) **Critical infrastructure impacted by the flood** - An event which leads to a protracted impact on a key utility service (water, sewage treatment, electricity distribution, gas distribution, telecommunications, rail network, strategic road network) in excess of 12 hours before restoration of the service.
- (f) **Key local essential services impacted by the flood** - An event which leads to a protracted impact to essential services or access to their facilities (emergency services, NHS, Local or Central Government services) particularly if the services relate to vulnerable communities or individuals (identified as Priority 1 functions within statutory business continuity plans), in excess of 12 hours before restoration of the service or access to it.
- (g) **Floods with a “known” cause** - An event where the flood is perceived as a “known” cause and a Risk Management Authority acknowledges that cause, no formal further investigation will be undertaken.



Figure 20 – Flooding of businesses in Hadley Summer 2007

11.2 SCOPE OF INVESTIGATIONS

Where a formal investigation is required the TWC will produce a Flood Investigation Report which will then be published on the Council's website and added to the GIS database. The report will include the following information:

- Site Location
- Assessment of the existing drainage network
- Frequency of flooding
- Number of properties affected
- Depth, area, and velocity of flooding
- Identification of critical infrastructure
- Impact on essential services
- Rainfall information
- Identification of causes
- Identification of responsibilities (where possible)
- Actions

A blank template of the Flood Investigation Report can be found in Appendix 2

11.3 WHERE A FORMAL INVESTIGATION IS NOT REQUIRED

As stated above it is essential that TWC appropriately allocates resources when investigating flood events, therefore priority will always be given to any event that meets the criteria set out in Section 10.

The majority of the flood events that occur within the Borough however will not be deemed significant. Whilst a formal report will not be produced for these flood events, TWC will still investigate the cause of the issue, however the scale of the response will be appropriate to the threat. These issues will also be added to the GIS database.

12. FLOOD RISK ASSET REGISTERS AND RECORDS

12.1 DUTY TO MAINTAIN A REGISTER

Under section 21 of the Flood and Water Management Act, each Lead Local Flood Authority (LLFA) has to establish and maintain:

- a) a register of structures or features which, in the opinion of the authority, are likely to have a significant effect on flood risk in its area, and
- b) a record of information about each of those structures or features, including information about ownership and state of repair.

The section 21 register is the only public, local source of information which will set out what structures or features are important to the management of flood risk in the LLFA area (e.g. structures that protect the local population against flooding). The asset register will be made available for inspection at all reasonable times, including inspection by the public. To book an appointment to review the asset register, contact the Local Flood Risk Officer by email at: flood@telford.gov.uk

12.2 LEVEL OF SIGNIFICANCE

The parameters for what information is to be included have already been established through the F&WMA which states that the register is to be of “structures or features which, in the opinion of the LLFA, are likely to have a significant effect on a flood risk in its area”. Therefore, it is for each LLFA to decide which structures or features it considers have a significant effect and to put the appropriate information on their register and record.

For the purposes of the flood risk asset register, any asset that prevents the scale significant flooding as set out in Section 10 of this report will be used. This definition of significant flooding will ensure that the register remains relevant, and is not filled with structures that provide minimal flood protection.

12.3 HOW ASSET INFORMATION WILL BE COLLECTED

The Flood Risk Asset register will hold information from a range of sources, and will contain details on structures in the ownership of private individuals, large companies/landowners, and Flood Risk Management Authorities. The following section will outline how this data will be collected from each source.

12.3.1 INFORMATION ON COUNCIL OWNED ASSETS

The Council’s GIS database contains information on land within the Borough owned by TWC. There is already good knowledge within the Council of areas that are susceptible to flooding therefore any features that are known to provide a flood defence role in areas owned by the Council will be added to the register.

In addition any SUDS feature adopted and maintained by TWC under their future role as the SUDS Approval Body (SAB) will be added to the register with any features that require specific or frequent maintenance, such as hydro break chambers, having their own specific reference number.

12.3.2 INFORMATION ON 3RD PARTY ASSETS

A high level sweep of the Borough using information contained on the Council's GIS database will initially be undertaken to identify assets that perform a flood defence. These will include large scale structures such as reservoirs that provide a balancing function, and known structures that perform a flood defence in areas already identified as being affected by flooding.

Once this process is complete the Flood Zones produced by the EA and SFRA Phase 2, along with Flood Map for Surface Water (FMfSW) provided by the EA as part of the creation of the PFRA will be used to identify areas in the Borough most at risk of flooding from surface water.

The FMfSW and property point information has been used to identify areas of 250m² that are most at risk as shown in figure 21 below. Priority will therefore be given to these areas for the collection of further asset information. Similarly, priority will be given to areas covered by the Floodzone mapping.

In addition to this process, any flooding reported to TWC that requires a site visit will include the identification of possible additions to the asset register. This will be an ongoing process with features identified and designated over time.

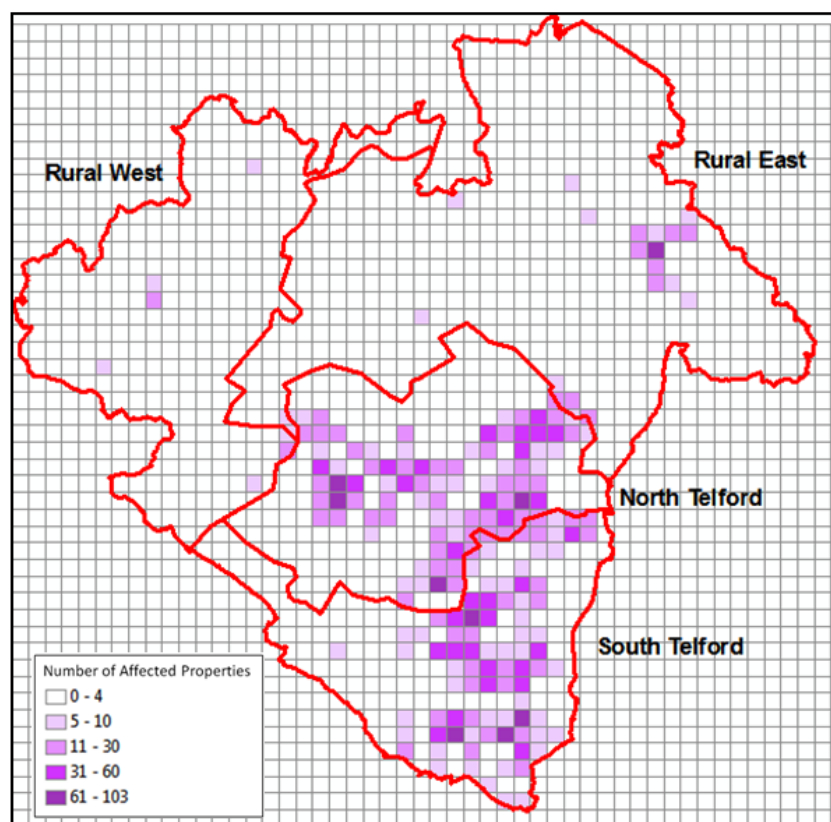


Figure 21 – Properties Susceptible to Pluvial Flooding

12.3.3 SEVERN TRENT WATER ASSETS

Access to the STW public sewer network mapping has already been provided to TWC as part of the creation of the SWMP. Although there is the potential for significant surface water flooding to occur should any piece of the sewer network fail, as this data is already on the Council's GIS database there is a possibility of duplicating data if every STW asset is added.

Information on flooding from STW assets on the DG5 register is also held by TWC. Although the DG5 register is a good record of existing flooding events, in some instances, the asset from which flooding occurs e.g. low lying manhole, is not actually the problem.

Flooding could be caused by a capacity issue further downstream which causes backing up and flooding at a low point. It could then be argued that the under capacity pipes should be put on the register, but the true root cause of the flooding problem may only be confirmed once a flooding scheme has been promoted and a feasibility been carried out.

For this reason the STW assets that will be contained in the asset register will include:

- Any STW asset that requires regular maintenance where if this maintenance was not carried out would result in significant flooding
- Any large STW assets that are not included in the sewer records such as impounded balancing reservoirs or flood meadows

12.3.4 ENVIRONMENT AGENCY ASSETS

At present the EA hold all information on their flood defence assets on the Creating Asset Management Capacity (CAMC) programme.

As with STW assets the only assets that will be added to the register are ones that require regular maintenance

12.3.5 STRINE IDB ASSETS

After Consultation with the Strine IDB, several structures have been identified that have the potential to cause wide scale flooding should they be unable to properly function.

Due to the nature of the area covered by the Strine IDB, any flooding would be to significant areas of farmland rather than properties. For this reason, no Strine IDB assets will be added to the register.

Information on Strine IDB assets that require regular maintenance, and information on the existing state of drainage channels in their ownership has been provided in the Strine IDB Individual Channel Report – Flood Risk from Structures.

12.4 SUDS AS ASSETS

The requirement for new development to appropriately manage surface water flows from development has already resulted in the construction of a large number of SUDS/attenuation features across the Borough. This number will increase in the future with each new development.

These SUDS features will be providing surface water attenuation for large numbers of properties and should there be a failure of these assets the resulting flooding is likely to put properties both on and off the development at risk. For this reason all new SUDS features will be designated and added to the register.

The Designation process will also be applied to SUDS serving single properties so that property owners will be required to seek approval from TWC when wishing to carry out any works that may affect the performance of these systems.

In addition TWC will undertake and exercise with the planning department to identify all SUDS features that have been installed in existing development and designate these features. This approach will result in a manageable list of drainage assets across the Borough.

12.5 HOW INFORMATION WILL BE STORED AND MANAGED

As each new asset is identified the structure will be designated as outlined above. Once this process is complete, the feature will be added to the Council's GIS database.

The layers created as part of the asset register will be stored on TWC's secure server. Access and admin rights to the register will be restricted to the Local Flood Risk Manager within the Engineering Services department.

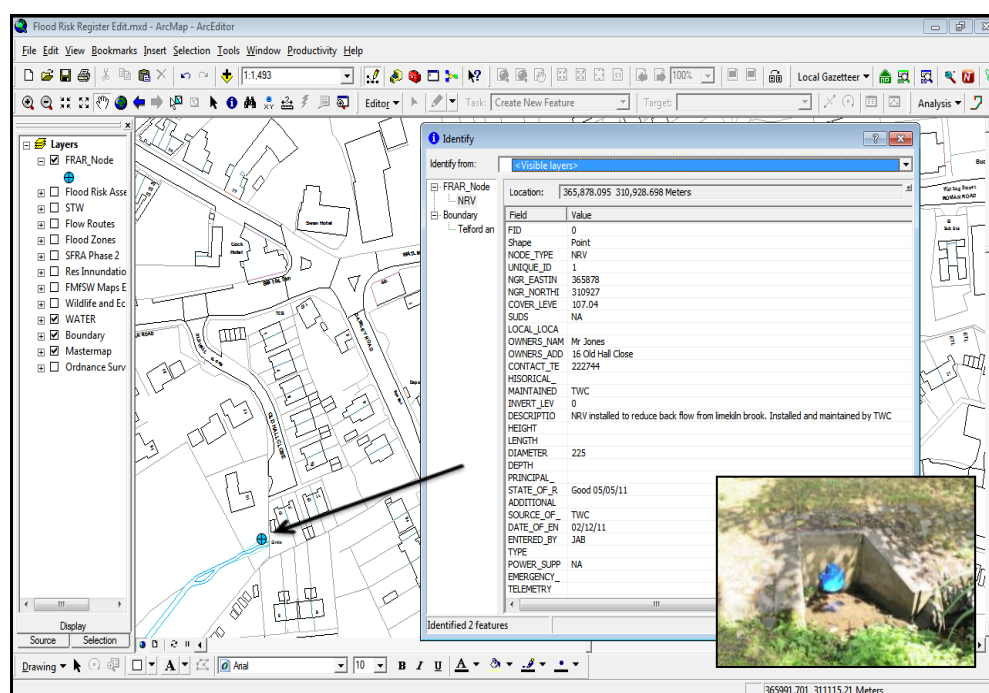


Figure 22 – Example of Asset Record

Each feature will be assigned an individual reference number, with information on the ownership and maintenance responsibility of the feature added within the attribute table. Where possible, a photographic record of each feature showing the existing condition will be recorded so that any future alterations or damage can be easily identified.

In order to ensure that the condition of the asset is taken into account when added to the register, TWC will utilise the EA method of asset inspection by using the national Condition Assessment Manual (CAM). The use of the CAM system will ensure that the condition grade of all assets can be equated on a nationally recognised scale. This approach will also assist in the prioritising of funding for future maintenance or improvement works.

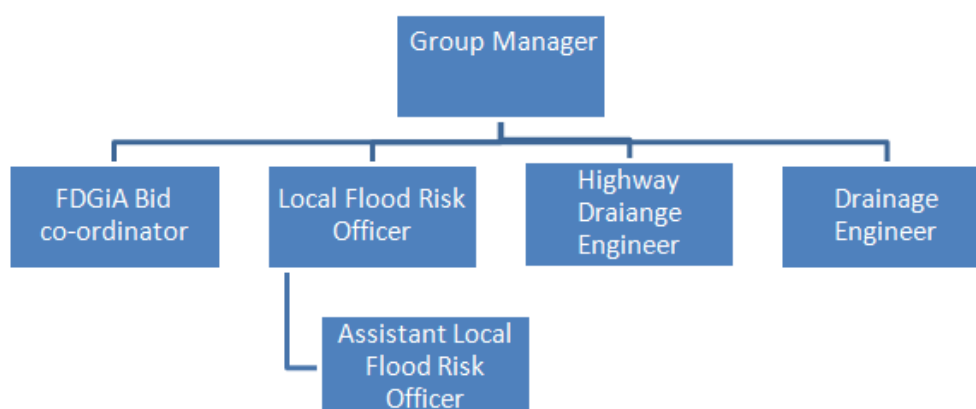
The layer will have a direct link to the Council's Management Information System (MIS) which identifies existing site constraints for new planning applications. Once a feature has been added to the GIS database, any new planning application that intersects or contains a designated feature will automatically consult the Local Flood Risk Manager who will be able to apply site specific planning conditions to ensure that the structure is either protected as part of the proposed works, or that any alterations are appropriate and will not affect the structures ability to provide flood protection.

13. AVAILABLE RESOURCES

The successful delivery of LFRM projects will require innovative ways of working based on partnership agreements to ensure that the outputs from available resources are maximised. TWC currently have good working relationships with other RMA's in the area, and the majority of previous flood defence projects have only been possible through this collaborative approach.

13.1 HUMAN RESOURCES

It is essential that TWC and other RMA's are appropriately staffed and are able to build capacity to order to comply with its duties as a LLFA.



Having considered the number of anticipated planning applications and current demand in staff from developers and other parties seeking guidance in respect to flooding matters, TWC proposed structure consists of a Local Flood Risk Officer and Assistant who are managed by the Group Manager with suitable professional status.

13.2 FLOOD RISK MANAGEMENT BUDGETS

The identification of sources of funding for flood alleviation and resilience projects is an important part of the strategy. The level of available funding from central and local government is limited, and will only be allocated to projects that not only protect properties, but that are environmentally and economically viable.

TWC will ensure that detailed and robust bids are submitted when funding is made available, and that schemes are implemented in the most sustainably cost effective way that will help to reduce flood risk and help to manage the impacts felt by communities.

Whilst this strategy is in support of the current LFRMS programme of measures, there will be an on-going requirement to fund work identified in future reviews of the LFRMS which may require different funding approaches. Funding should therefore be seen as a long term endeavor, and short term gains should always be considered against the potential for greater returns in the longer term.

TWC is committed to flood alleviation within the borough. As a consequence of this commitment, £97,000 per annum is committed from the Council's Central Budget to provide sufficient funding for the development of the temporary flood defences in Ironbridge. This is an ongoing commitment that is now in its 10th year of existence.

13.2.1 DEFRA CAPACITY BUILDING FUNDING

Defra is committed to funding LLFAs to carry out their new responsibilities under the Flood and Water Management Act. Up to £36 million a year will be provided directly to LLFAs and this started at £21 million in 2011/12.

TWC received £147,000 in 2011/12 and 2012/13. This funding has been extended to 2015; however there is no guarantee that Central Government will continue to allocate funding after this date.

This budget funds a Local Flood Risk Officer Post who is responsible for ensuring that TWC fulfils the new roles and responsibilities under the FWMA. In some cases the budget may also be used to fund investigations into flooding where it is not possible to identify the cause or relevant responsibility.

13.2.2 FLOOD DEFENCE GRANT IN AID

In some cases significant work will be required to address a flooding issue. For many of these large projects external funding may be required.

Flood Defence Grant in Aid (FDGiA) is funding made available to Local Authorities by Central Government to undertake projects which reduce flood risk from surface water, fluvial, and coastal sources. The Process of applying for this funding is administered by the EA on behalf of DEFRA. In order for schemes to be eligible for FDGiA they have to reduce flood risk, but also be buildable, environmentally acceptable, and cost beneficial.



**Figure 23 – Example of Benefits from FDGiA Funding in Telford:
Provision Flood Resistant Doors to Properties in Wellington**

There are always more schemes proposed than there is government funding available in any one year. The Regional Flood and Coastal Committees (RFCCs) play an important role in agreeing programmes of work, and can raise extra funding from local authorities, known as local levy. They are made up of a majority of elected members from local authorities and representatives from other local interest groups. There is however no guarantee that local levy

funding will be allocated to a project by the RFCC therefore securing additional funding from external sources is key to progressing a project.

Additional financial contributions for projects may be sought from land and property owners that will benefit from the scheme, but also other statutory bodies or organisations that own assets in the affected area. As these contributions will reduce the amount of funding required from central government the greater the contribution the greater the likelihood of the scheme being granted FDGiA funding.

Where appropriate TWC will identify projects that may be eligible for FDGiA funding. Once these projects have been identified TWC will put together a funding bid for submission to the EA. Where possible TWC will work with local partners, businesses and residents to secure additional funding to increase the likelihood of each bid being accepted.

A list of the bids currently submitted for FDGiA funding can be found on the Council's website. This list will be updated on a yearly basis, or when new funding bids have been submitted.

[Link to be made available once complete](#)

13.2.3 MAXIMISING EFFICIENCY WITH STAKEHOLDERS

At present there are several risk management authorities operating within the Borough, each with their own independent asset management plans and schedules. In some cases it may be cost beneficial to co-ordinate resources to maintain more than one asset in a single location, for example the clearance of grilles during the routine maintenance of a watercourse.

A coordinated approach led by the TWC as the LLFA is therefore considered essential and a shared programme of Flood Risk Management should be promoted. In order to establish where these savings can be made TWC will meet with each of the other risk management authorities to identify where this approach may be possible.

13.2.4 ALTERNATE FUNDING SOURCES

Private Individuals/businesses: Localised funding from properties and businesses that will benefit from a flood defence project is an important source of funds. Where possible properties should look at flood resilience and what they can do to protect their own property during flood events if other sources of funding are not forthcoming.

Severn Trent Water: STW can invest in the sewerage network to reduce flood risk, but are increasingly willing and able to invest in non-Severn Trent Water assets where there is a benefit to the performance and operation of the sewerage network

Community Infrastructure Levy: This is a locally agreed sum levied upon developers and large sums could potentially be raised over time. It is flexible in its approach as local authorities can adjust spending plans to meet priorities. It is estimated that the introduction of the levy has the potential to raise around £1billion a year of funding for local infrastructure by 2016. Local authorities are required to use this funding for infrastructure needed to support the development; it can be used to construct new infrastructure, increase the capacity of existing infrastructure or repair failing existing infrastructure including flood defences. Telford & Wrekin Council do not currently operate a Community Infrastructure Levy, however this will be kept under review alongside the development of the new Local Plan Shaping Places.

Section 106 (Town and Country Planning Act 1990): this is a contribution from developers, linked to specific developments and the infrastructure required to make them acceptable in planning terms. It can be very specific to the issue being addressed and is negotiated separately for each development. It can be used to pay for defences that specific developments need in order to be safe and so acceptable in planning terms.

14. FLOOD RISK FROM NEW DEVELOPMENT

Since its creation as a new town in the 1970's, Telford has always been identified as an area for growth for both industry and housing.

Although there are clearly benefits associated with additional housing growth in the Borough, any new development will place additional pressure on the existing surface water infrastructure. For this reason it is essential that TWC is able to manage new development in such a way that it does not have an adverse affect on the surrounding surface water environment.

In order to ensure that new drainage systems serving new development is designed in a sustainable and manageable manner, the drainage system serving any new development in Telford must comply with the 2015 DEFRA [Technical Standards for Sustainable Drainage Systems](#) document and the most up to date version of the CIRIA SUDS Manual.

To support and supplement this national guidance TWC will publish a developer guidance document that sets out design requirements for Sustainable Urban Drainage Systems (SUDS). Some of the interim key policies that developers must adhere to are listed below:

- Surface water runoff from Greenfield sites should be restricted to Greenfield runoff rates
- Surface water runoff from Brownfield sites should be reduced by a minimum of 50%, with sites being restricted to as near as greenfield rates as possible. In catchments susceptible to flooding TWC reserve the right to require additional betterment on a case by case basis.
- All SUDS systems should be capable of dealing with a 1 in 100 year storm event +30% allowance for future climate change
- Additional modelling allowances should be provided in residential development to cater for urban creep as set out in section 14 of this document
- Whilst below ground storage may be suitable on some developments, open air SUDS features are TWC's preferred method of surface water attenuation and may be adopted if an appropriate commuted sum can be agreed.
- Developers should engage with TWC at the earliest opportunity to ensure that the proposed drainage design will be acceptable and that it provides the relevant number of treatment stages and amenity benefits.
- All SUDS or attenuation features should be located in an area of Public Open Space to allow access for future maintenance.

Development will only be permitted if it meets the requirements of the national and local guidance document. As TWC act as both the LLFA and the LPA these requirements will be managed through the planning process. Information to satisfy the above requirements will be required as part of any application for new development. TWC will then review the information and provide developers with either approval, conditional approval, or refusal.

14.1 ADOPTION OF SUDS BY TWC

Whilst it is essential that SUDS systems are properly designed, if they are not properly managed the functionality of the system can degrade over time leading to decreased storage and increased flood risk. At present the future management of these features has not been properly established, with some features being maintained by management companies set up by the developer.

Although this approach is acceptable in the short term, the nature of the building industry may result in features being poorly maintained or even abandoned should these companies cease trading. When this occurs it is usually the Council that homeowners look to for future maintenance of these “orphaned features”. Unfortunately there is no budget to cater for this approach therefore it is preferable that the Council adopts the feature as part of the public open space.

TWC are willing to adopt SUDS features on new development if the design of the feature meets the requirements of the SUDS guidance document. As the Local Authority, TWC has the necessary tools and expertise to maintain SUDS features as part of the adopted public open space over the lifetime of the development. In order to ensure that TWC has the appropriate funds to maintain these features, an adequate commuted sum will be required.

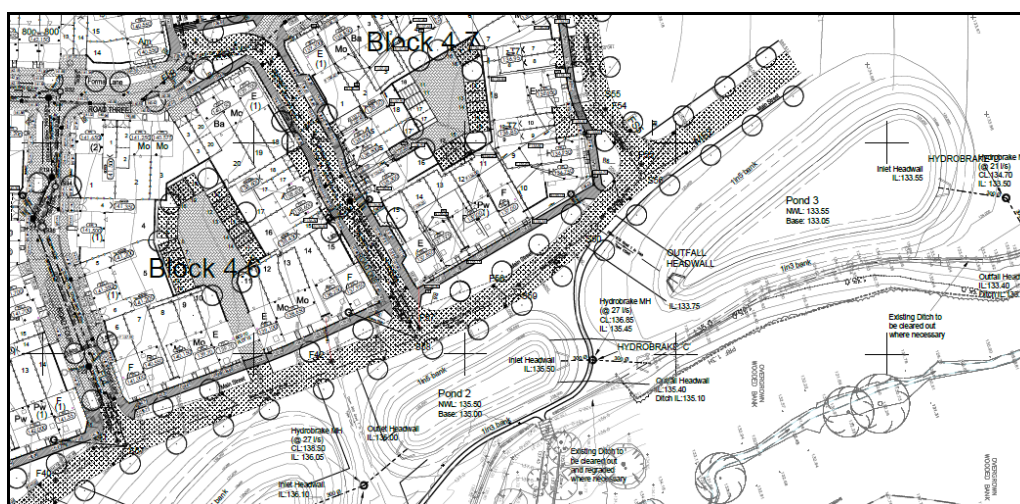


Figure 24 – Approved SUDS Layout Drawing

The value of the commuted sum will depend on the proposed lifetime of the development. Commercial developments such as industrial warehouses are likely to be significantly altered or re-developed within a relatively short time period; therefore a 30 year commuted sum will be required prior to adoption.

The lifetime of residential developments however is likely to be significantly longer, with any adopting body potentially required to maintain any SUDS feature in perpetuity. For this reason an appropriate and reasonable commuted sum will be required to ensure that TWC is not left out of pocket in the long term. For all residential developments a 50 year commuted sum will be required prior to adoption.

As each site will employ different SUDS techniques to manage surface water flows, a bespoke commuted sum will be required for each development. In order to equate the commuted sum, TWC have developed a SUDS adoption spreadsheet which can be found on the Council's website

[Link to be made available once complete](#)

This spreadsheet will apportion a cost to each of the management functions required to properly maintain a SUDS system, and provide the total cost for maintaining a site.

The total maintenance cost for the site will be significant, however as this figure will be spent over the lifetime of the development current and future interest and inflation rates must be taken into account. The type/life span of the development must also be considered.

To ensure that the SUDS system is functioning completely a defects period of one year will be included in the maintenance agreement. This period will allow TWC and the developer to identify any defects and to ensure that the feature is functioning properly prior to it being adopted by TWC.

In addition, all new SUDS features will be added to the Flood Risk Asset Register in line with the requirements of Section 12.

14.2 ADOPTION OF SUDS BY MANAGEMENT COMPANY

Should a developer not wish to put a SUDS feature up for adoption by TWC, or if the surface water attenuation for the site would not be considered for adoption (if being provided below ground), details on the future maintenance of each attenuation feature should be submitted as part of the planning application.

If the proposed SUDS features will be maintained in the future by a management company, full contact details (to include 24 hour emergency contact) will be required. In addition evidence that the proposed management company has the relevant insurance to ensure that should the company cease to trade that arrangements are in place for the continued maintenance of the feature.

If the land in which the feature sits is to be retained by the developer, these details will also be required to allow enforcement action if required. Further information on these requirements can be found in the developer guidance document.

14.3 URBAN CREEP

Urban development generally leads to an increase in roads, roofs and other impermeable surfaces, causing a corresponding reduction in permeable surface area. Following construction, the impermeable area continues to increase as residents install or enlarge patios, extensions and driveways, this is commonly known as 'urban creep'.

The development of impermeable surfaces reduces the opportunity for rainfall to infiltrate into the soil, and consequently lowers the time taken for runoff to enter sewer systems or watercourses. At the catchment scale, the consequences are that peak flows are more pronounced and runoff volumes are greater. At the site scale, the increase in impermeable area can lead to premature surcharge of the drainage network, and subsequent flooding. In addition to the impact on water quantity, urban creep can also have a significant impact on water quality, as deposited pollutants are washed off during rainfall events. Figures 25 and 26 below show evidence of urban creep in Telford between 1999 and 2010.



Figure 25 - Evidence of Urban Creep between 1999 and 2010 in Telford

14.3.1 ALLOWANCE FOR FUTURE URBAN CREEP

Investigations into the areas of additional hardstanding resulting from urban creep have been undertaken by Allitt and Tewkesbury for CIWEM. Through the use of GIS software and aerial photography it has been possible to compare areas of hardstanding in five cities over several years.

The investigation showed that on average, urban creep within residential developments equates to **0.749m²/house/year** which could have a significant impact on sewerage networks. For this reason an additional safety factor should be added to design calculations when designing drainage systems serving new residential development.

The housing density of each development will have a direct impact on the potential for and impacts of future urban creep. For this reason the design of any drainage systems serving residential development in the Borough will be required to provide an additional modelling allowance based on the density of the development as set out in Table 14 below.

| Residential development density Dwellings per hectare | Change allowance % of impermeable area |
|--|---|
| ≤ 25 | 10 |
| 30 | 8 |
| 35 | 6 |
| 45 | 4 |
| ≥ 50 | 2 |
| Flats & apartments | 0 |

Table 14 – Additional Allowance for Urban Creep

It is unlikely that urban creep will be associated with large commercial developments as any these will be designed to a specific capacity. Any alterations to the areas of impermeable hardstanding are likely to be on a larger scale such as factory extensions or the enlargement of parking/loading areas. Development of this type and size will require planning permission/SAB approval and therefore any additional runoff generated will have to be attenuated on site. For this reason no additional allowance will be applied to any commercial development.

Tewkesbury, A & Allitt, M 2009. Investigations into Urban Creep at 5 Cities

http://www.raaltd.co.uk/cms-files/Investigations_into_Urban_Creep.pdf



Figure 26 - Evidence of Urban Creep between 1999 and 2010 in Telford

15. IMPROVING FLOOD RISK MANAGEMENT

Whilst TWC hold a large amount of data on where flooding is likely to occur, it is not possible to allocate sufficient resources to continually monitor these locations. For this reason it is important that the public are able to quickly and efficiently report any occurrence of flooding to the relevant Council department. It is also essential that after a flood event that the extent and cause of the flooding is properly investigated and recorded to assist in future investigations or for the submission of bids for funding to address the issue.

15.1 HOW TO REPORT A FLOOD EVENT

Members of the public can report a flooding issue to TWC using any of the following methods:

By Telephone: 01952 384000 (TWC Corporate Contact Centre)

Online: [TWC Online Flood Form](#)

It is recommended that flooding is reported by phone as this will increase the likelihood of an immediate response. If the problem is an emergency or if someone's life is in danger the emergency services should be contacted in the first instance.



Figure 27 – Flooding in Coalbrookdale

15.2 IMPROVED RECORDING OF FLOOD EVENTS

TWC are currently establishing a new method of recording flood events based on incoming calls from the public. The system is known as M3 and is an electronic customer enquiry management system used for logging jobs within the Neighbourhood and Leisure Services team.

Enquiries are received from the public by the corporate contact centre and then transferred into the M3 system. Each report of flooding will be logged based on the information provided by the caller and assigned to the relevant officer either on their desktop or via a mobile device if the officer is working within the Borough. The Officer will then attend and assess what works will be required, or undertake further investigations should it not be possible to identify the cause of the flooding.

The system allows the officer to record details of actions carried out on individual jobs, and allows attachments such as documents and photos to be added to the file from on site.

Whilst the M3 system will be useful in responding to minor flooding such as a result of a blocked gully, the system will assist in the identification of more significant flood events.

Any occurrence of internal flooding reported through the M3 system will be added to the Council's GIS database. In any location where the extent of the flooding is enough to trigger a formal investigation by TWC, as set out in Section 11, a link to this investigation and its findings will be added to the attributes of the file.

The mapping of these flood events will assist TWC in identifying locations where flooding re-occurs on a regular basis, and locations where flood alleviation schemes may be viable. This approach will also assist in the identification of structures that provide a flood defence and should be designated as set out in Section 12.

15.3 SOCIAL MEDIA

The use of social media is an important tool in sending messages to the public during flood events when circumstances are likely to change rapidly and where information needs to be disseminated as quickly as possible.

- **Follow Telford and Wrekin Council on:**

Facebook at www.facebook.com/telfordwrekin

Twitter at www.twitter.com/telfordwrekin

- **Follow the Environment Agency on:**

Facebook at www.facebook.com/environmentagency

Twitter at www.twitter.com/EnvAgency

This format is particularly useful during the deployment of the Ironbridge Flood Barriers as updates on the deployment and safety messages can be sent out as the situation develops. Examples of the Facebook and Twitter messages sent out by TWC during the deployment of the barriers during winter 2014 can be found below.

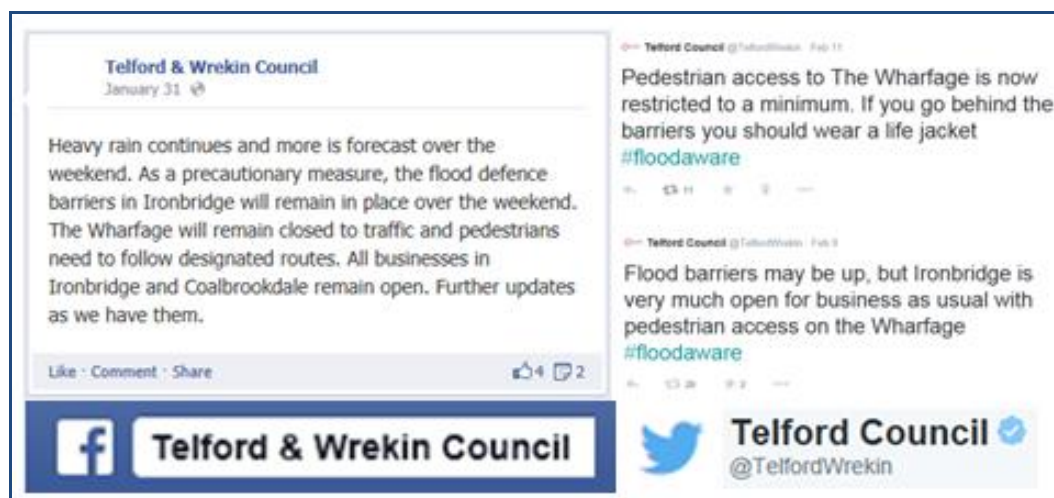


Figure 28 – Use of TWC Social Media during Flood Events

TWC will aim to re-publish information such as severe weather warnings from the met office and updates from the EA flood warning service to ensure that any person following any of the social media accounts is kept up to date with the level of flood risk in the Borough.

During a flood event any relevant information such as the closure of a highway, location of rest centres, and advice on how to protect your property will be provided if appropriate.

As the Council's social media outlets are viewed by a wide range of people, this information can be accessed by members of the public that may not have been identified at risk of flooding, allowing them to make precautions for adverse conditions either at home or prior to making a journey.

For this reason TWC will continue to promote the use of social media and ask all persons affected or concerned by flooding to follow the Council's and the Environment Agencies Facebook and Twitter profiles.

15.4 IMPROVING LOCAL FLOOD RESILIENCE

Whilst TWC as the LLFA will aim to investigate and resolve flooding issues within the Borough, we will also aim to improve awareness of the signs of flooding and community resilience particularly in areas that have been identified at risk of flooding or have experienced flooding on more than one occasion.

15.4.1 RAISING AWARENESS OF RISKS AND COMMUNITY ENGAGEMENT

The impacts of flooding can be significantly reduced if individual property owners and the wider community know the signs of possible flooding in the area, and are able to make preparations to protect their property and assist those that may require additional support.

In areas where 3 or more properties have been previously been affected by flooding, or where 3 or more are shown to be at risk, TWC will aim to work with the residents to set up a Community Flood Action Group. Guidance on establishing a Community Flood Action Group can be found on the National Flood Forum website:

<http://www.nationalfloodforum.org.uk/flood-risk-community-groups/how-to-form-a-flood-action-group/>

15.4.2 PROMOTE AWARENESS OF FLOOD WARNING SYSTEMS

It is essential that properties receive as much notice on the likelihood and extent of flooding as possible to allow them time to react to flood warnings in a timely and effective manner. In specific flood risk areas, the EA issue flood warnings via the [Floodline Warnings Direct](#) system or via the online National Flood Summary webpage.

At present the EA only provide a flood warning via the National Flood Summary service in the following locations:

- [River Severn at Buildwas](#)
- [River Severn at the Wharfage, Ironbridge](#)
- [River Severn at Ironbridge and Jackfield including Coalport](#)
- [Rivers Tern, Perry, Roden, Strine and Meese and their tributaries](#)

TWC will promote the use of the EA Flood Warning Service for properties at risk of fluvial flooding, and will work with the EA to extend the flood warning service to other main rivers where possible, particularly the Coal Brook RRC.

TWC will aim to provide an independent warning service on Ordinary Watercourses that are known to cause locally significant flooding subject to the securing of necessary funding.

15.4.3 INDIVIDUAL PROPERTY PROTECTION

Although TWC will investigate flooding affecting properties or critical infrastructure within the Borough, there will always be instances where the works necessary to resolve the issue will require the expenditure of considerable resources that are not currently available. In some cases there may be a significant amount of time between the cause being identified, and the works being undertaken, and in some extreme cases such as flooding from the River Severn, it may not be physically possible to prevent flooding from occurring.

In locations where it is unlikely that large scale flood defence schemes are planned or possible, TWC will aim to improve community resilience through the use of Individual Property Protection (IPP) or flood resilience products.



Figure 29 – Example IPP Products in Telford

Flood resilience products prevent or minimise the amount of water that enters a building during a flood event. The exact method of providing flood resilience will differ between each property and location.

Where possible TWC will put forward IPP projects for FDGiA funding as outlined in Section 13, however in locations where few properties are affected it may be difficult to secure funding. In these locations the cost of IPP will have to be covered by the individual homeowner.

Details on how to protect your property from flooding can be found on the [National Flood Forum](#) website. Further information on Flood resilience products can be found on the [Blue Pages](#) website.

In locations where homeowners are not able to afford flood resilience measures the Department for Work and Pensions provide crisis loans for people who cannot meet their immediate short term needs in an emergency or as the result of a disaster. Details about how to apply and who is eligible can be found at <https://www.gov.uk/crisisloans>.

For more information on obtaining flood protection insurance, see the leaflet Obtaining Flood Insurance in High Risk Areas, published in partnership by Defra in July 2012:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69578/pb13082-flood-insurance.pdf

15.5 MAINTENANCE OF DRAINAGE INFRASTRUCTURE AND WATERCOURSES

TWC own and maintain a variety of surface water features within the Borough. These include features such as lakes and watercourses (when located in or where they pass through Council owned land), but also physical structures such as headwalls and grilles.

Each of these features will require regular maintenance to ensure that the feature can pass forward adequate flows during periods of heavy rainfall. TWC's Environmental Maintenance Department are responsible for the day to day maintenance of areas of open space, however should a feature require large-scale improvement or desiltation works, alternate budgets may be required. For this reason it may not be possible to undertake necessary works until funding is made available. Details on existing and available funding can be found in Section 13.

Whilst the maintenance of many small assets in the Borough will be relatively simple (the clearing of grilles etc), some assets will have more complex maintenance requirements that would not be obvious without specialist knowledge such as vortex flow control devices, penstocks, or pumping requirements.

For this reason TWC will produce Drainage Infrastructure Operation Plans (DIOP) for appropriate Council owned assets. These plans will set out in plain English the operation and maintenance requirements for each asset and will be linked to the Council's GSI system. Where an asset does not require a DIOP but has a specific maintenance requirement this information will also be added to the GIS database.

In addition where a Council structure or asset meets the criteria as set out in Section 12 it will be designated and added to the Flood Risk Asset Register.

15.5.1 HIGHWAY GULLIES

At present TWC maintain approximately 32,000 highway gullies in the Borough. They perform a vital function in draining the public highway during periods of heavy rainfall and, protect both properties and the Boroughs transport infrastructure from flooding.

In addition to the disposal of surface water, highway gullies also remove suspended solids from highway water by slowing down the rate of flow within the gully pot. It is the build up of these suspended solids in the gully pots that can impact on the functionality of the system if not properly maintained.

The required frequency of emptying depends upon the location, extent of tree cover, level of rainfall, the extent of kerbing and the frequency of sweeping. The nature of local industrial and agricultural land use may also be influential.

In low risk locations, TWC will aim to cleanse all highway gullies within the Borough on an annual basis. In order to manage the annual cleanse, the Borough has been split into 14 management units as shown below. The cleansing schedule will then be managed by TWC to ensure that all units are maintained sequentially.



Figure 30 – Rural Highway Flooding

The impact of drainage system failure will be greater on high speed roads; therefore a specific management unit has been allocated to main roads that will require traffic management, and to the A442 which will be managed under road closures during the annual spring clean.

TWC are currently plotting the location of each of the highway gullies it maintains. At the time of writing this report approx 23,000 gullies have been identified and plotted onto the Council's GIS database. It is hoped that once complete, this layer will enable TWC to better understand its highway assets, and also aid in the identification of gullies in high risk areas.

The impact of drainage system failure will be greater in these high risk areas; therefore TWC has established a Priority Gully List for any area that is known to be severely affected by flooding. In these areas TWC will aim to cleanse the highway gullies on a quarterly basis.

The priority list is based on TWC's assessment of the risk posed to the internal flooding of properties, and can be added to by TWC where deemed appropriate. In addition areas may be removed from the list should works be undertaken to address the cause of the flooding.

In addition to the annual cleansing of the gullies, TWC also respond to emergency highway flooding issues. Priority is given to locations where flooding is affecting property or where the highway is severely affected. For other non-priority reports such as a report of a blocked gully, TWC will aim to respond to the request within 2 weeks.

As they will be dealt with as a priority, the frequency and number of emergency calls has the potential to affect the ability of TWC to complete the annual cleansing of all gullies. For this reason any management units that are not cleansed within the year will be given priority in the following year's management plan.

In addition to the highway gullies TWC are also responsible for any section of watercourse that is culverted under the public highway.

15.6 CONSENTING WORKS ON ORDINARY WATERCOURSES

Telford & Wrekin Council, as the LLFA, are now responsible for the consenting of any works to ordinary watercourses within the Borough in areas not covered by an Internal Drainage Board.

This responsibility follows commencement of paragraphs 32-34 of Schedule 2 of the Flood and Water Management Act 2010, which makes amendments Section 23 of the Land Drainage Act 1991.

The responsibility for consenting works to main rivers remains with the Environment Agency.

Further information on the consenting of works on [Ordinary Watercourses](#) can be found on the Council's Website.

15.7 RIPARIAN RESPONSIBILITIES

The free flowing of water through watercourses is essential to minimizing flood risk in the Borough; however the majority of land and property owners are not aware of their responsibilities when it comes to routine maintenance and the removal of blockages. These responsibilities will also apply to any stream, ditch, curveted watercourse, and land drains, therefore for the purposes of this section these features will collectively be known as a watercourse.

Unless the deed to the property states otherwise, any property or land owner who either owns land adjacent to, or containing, a watercourse are known as Riparian Owners under Common Law, and have responsibility for ensuring the free flow of water within their section of the watercourse. A more detailed explanation of the roles and responsibilities of a riparian owner can be found on the EA [Living on the Edge](#) guidance document.

In order to increase the awareness on watercourses susceptible to flooding, TWC will provide additional information on riparian responsibilities to adjacent properties. It is hoped that this approach will ensure that riparian owners will understand that they are responsible for the removal of blockages and the consequences of flooding and the benefits of regular maintenance.

15.7.1 ENFORCEMENT

Due to the lack of awareness of riparian responsibilities, flooding from a poorly maintained private asset such as a grille or culvert entrance is a common occurrence. Whilst the majority of landowners will address this issue once identified, the failure to do so may result in disputes with affected properties. TWC as the LLFA will aim to assist in these situations through community engagement between landowners and affected properties to identify the cause of each issue and the responsibility for works or maintenance requirements.

However, should it not be possible to resolve an issue through community engagement, TWC as the Land Drainage Authority has powers under the Land Drainage Act 1991 to serve notice to legally require landowners to undertake works to restore the flow of water through a watercourse or other such feature. Failure to comply with this notice may result in TWC undertaking the works in default, with all expenses being covered by the land owner.

16. IRONBRIDGE TEMPORARY FLOOD DEFENCES

The Ironbridge Flood Defence Barrier scheme was developed during 2004 in a partnership between the Environment Agency, T&WC, STW and a resident's flood action group. The barriers have been vital in allowing property owners on the Wharfage to maintain their properties aesthetic appearance for tourism purposes and to meet the requirements of the World Heritage Site Status.

16.1 FLOODING IN IRONBRIDGE

Ironbridge has a history of flooding with significant flooding of the Wharfage occurring in 1946, 1947, 1948, and more recently; 1990, 1993, 1994, 1995, 1998, 2000, 2002, 2004, 2007, 2008, 2011, 2012 and the winter of 2013/14.

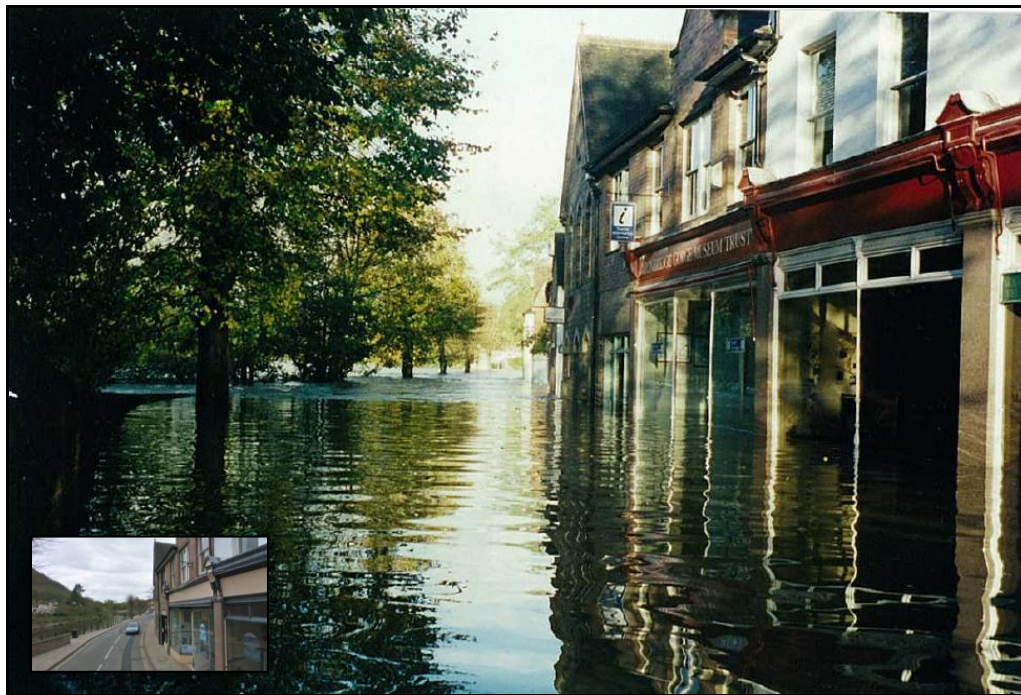


Figure 31 – Flooding in Ironbridge during floods of 2000

During 2004, a partnership between the Environment Agency, Telford & Wrekin Council and Severn Trent Water developed a Temporary Flood Defence Barrier scheme for the Wharfage, Ironbridge. The flood barrier provides flood protection from the River Severn up to 1 in 20 year flood event (5% annual flood probability). 7 businesses along the Wharfage and 25 residential properties are protected by the barriers during periods of high river levels in the Severn.

16.2 BARRIER CONSTRUCTION

The Ironbridge Barriers consist of a metal frame with a plastic impermeable membrane. The barriers are installed and managed by the Environment Agency. Once flood levels on the Buildwas river gauge are 4.6mAGD (Above Gauge Datum) and predicted to reach 5.1mAGD the barriers will be mobilised and installed on the Wharfage.



Figure 32 – Barrier Construction

16.3 ON SITE RESPONSIBILITIES

Once the barriers are erected, the Environment Agency provide 2 trained members of staff, 24 hours a day, on the Wharfage, to ensure the defence is working effectively and is not damaged by river debris. Telford and Wrekin Council are responsible for managing pedestrian and vehicular access to the Wharfage whilst the barriers are deployed. This includes closing the Wharfage to traffic and installing a diversion route. There will be 1 trained member of staff available at all times on the Wharfage to deal with problems arising from pump failures and /or the highway drainage system. The council will also act as the key contact for residents, business and member of the public enquiries.



Figure 33 – Ironbridge Flood Defences in Action in 2008

17. ENHANCEMENT OF THE NATURAL ENVIRONMENT

The implementation of flood risk management options and measures provides TWC with a significant opportunity to improve the natural, rural and built environment across the Borough. The Flood and Water Management Act states that the LFRM strategy must specify how it will contribute to the achievement of wider environmental objectives and sustainable development.

17.1 IMPACTS OF THE LFRM STRATEGY ON THE NATURAL ENVIRONMENT

The primary aim of the LFRM Strategy is to reduce the possibility of, and limit the impact of flooding on individual properties and communities within the Borough. It is however essential that in protecting properties, and imposing requirements on new development, that the natural environment is not adversely affected. The policies included in this strategy should promote the protection of existing and where possible create new natural habitat.

17.2 STRATEGIC ENVIRONMENTAL ASSESSMENT

Due to the potential impact the LFRM Strategy will have on both the natural and surface water environment DEFRA has determined that a statutory Strategic Environmental Assessment (SEA) will be required.

A copy of the SEA for this LFRM Strategy can be found in Appendix 3.

17.3 NATURAL SOLUTIONS TO FLOOD RISK MANAGEMENT

It is commonly accepted that alongside more traditional flood risk management schemes such as flood defences and channel improvement works that there is a key role that more natural solutions can play in reducing flood risk.

Such techniques can include the use of woodland to retain water and slow the rate it enters rivers and streams or land management techniques that retain water and encourage more infiltration. This approach to managing flood risk is supported by the English Severn and Wye RFCC, and currently there is a trial project using rural suds (sustainable drainage systems) in the Gloucestershire area.

A scheme involving the planting of woodland to reduce flood risk and slow the rate that water enters streams and rivers is currently proposed in Shropshire, which is beneficial for areas in Shropshire as well as other downstream communities within the River Severn catchment.

These techniques to managing flood risk can also provide other benefits in improving water quality by reducing the amount of diffuse pollution as well as providing improved habitat.

17.4 CULVERTING OF WATERCOURSES

Telford and Wrekin Council are generally opposed to the culverting of watercourses because of the adverse ecological, flood risk, human safety and aesthetic impacts. Watercourses are important linear features of the landscape and should be maintained as continuous corridors to maximise their benefits to society.

The Flood and Water Management Act defines a “culvert” as a covered channel or pipe designed to prevent the obstruction of a watercourse or drainage path by an artificial construction.



Figure 34 – Example of a Culverted Watercourse in poor condition on Lyde Brook

TWC will consider each application to culvert a watercourse on its own merits and in accordance with our risk-based approach to permitting. We will only approve a culvert if there is no reasonably practicable alternative, or if the detrimental effects would be so minor that a more costly alternative would not be justified. In all cases where it is appropriate to do so, applicants must provide adequate mitigation measures; accept sole ownership and responsibility for future maintenance.

TWC will normally object to proposals to build over existing culverts because of health and safety considerations, increased maintenance costs, and because this would preclude future options to restore the watercourse.

TWC will actively pursue the restoration of culverted watercourses to open channels.

17.4.1 ISSUES ASSOCIATED WITH THE CULVERTING OF WATERCOURSES

The following issues are associated with the culverting of watercourses:

- Increased likelihood of flooding due to obstruction of flow and risk of blockages, and loss of floodwater storage leading to increased impact of flooding
- Loss of and adverse effects on natural morphology, fisheries and wildlife habitat including substrate
- The creation of barriers to fish passage through increased water velocities, shallow depths and eroded culvert entrances
- Increased river bank and bed erosion downstream of culverted sections
- Greater difficulties in providing for drainage connections
- Increased liabilities and costs due to the need to maintain, repair and replace culverts
- Increased health and safety hazards, notably for workers clearing blockages
- Locally reduced groundwater recharge
- Increased difficulty in detecting the origins of pollution and in monitoring water quality.

17.4.2 LEGAL REQUIREMENTS

Any culverting of a watercourse, or the alteration of an existing culvert, requires flood defence consent:

- On main rivers, prior written consent from the Environment Agency is required under Section 109 of the Water Resources Act 1991. Conditions can be imposed
- On all other watercourses, except within the district of an IDB, consent from Telford and Wrekin Council is required under Section 23 of the Land Drainage Act 1991. Further information on consenting works on [ordinary watercourses](#) can be found at:
- In areas covered by the Strine IDB, the consent of the IDB is required under the Land Drainage Act 1991
- Highway authorities are required under Section 339 of the Highways Act 1980 to seek the consent of the drainage authority before carrying out any works affecting a watercourse.

17.4.3 PERMITTED CULVERTING

There are situations where culverting may be unavoidable in practice, such as short lengths for access purposes, or where highways cross watercourses. In these cases, alternatives must first be considered before the construction of a culvert will be permitted. Alternatives to a culvert may include one or more of the following:

- Relocating the infrastructure elsewhere to avoid the need to cross the watercourse, or utilising an existing crossing point.
- Using a bridge instead of a culvert.
- Diverting the line of the watercourse and enhance the ecology and amenity as part of the project.
- Combining channels to reduce the number of crossing points.

Applicants will be required to prove why culverting is both necessary and the only reasonable and practicable alternative, and to provide information to show that it will not have a detrimental effect on flood risk and the habitat(s) and species present, or that mitigation measures can be put in place to reduce these effects.



Figure 35 – Blockage of Highway Culvert at Coalport High Street Resulting in the Flooding of 3 Properties

Where a culvert is deemed to be acceptable, the design should follow the principles in the associated Environment Agency technical guidance.

The length of any culvert should be restricted to the minimum necessary to meet the applicant's objective. The proposal must include appropriate assessment of flood risk and environmental impact. The applicant should take into account the possible effects of climate change and future development in the catchment on the watercourse when calculating the capacity of the culvert. Mitigation measures such as mammal ledges must be incorporated within the design, and the work must be carried out using best working practice to minimise environmental impact.

17.4.4 REMOVING WATERCOURSES FROM CULVERT

Removal or 'daylighting' of culverts can have major benefits for flood risk management, ecology, amenity and redevelopment. Any site that contains a watercourse currently in culvert will be required to restore the watercourse to open channel as part of the proposed development.

Modeling of the restored stretch of watercourse may be required to ensure that the proposed new section of open channel can accommodate flows from upstream without causing flooding to adjacent properties or infrastructure.

Where possible the new section of open channel should follow the historical line of the watercourse. Finding the old channel can be difficult. It often involves historic research, examination of soils, and looking at the channel characteristics upstream and downstream. For this reason Telford and Wrekin Council will provide access to historical mapping held by the Council for the identification of such features.



**Figure 36 - Flooding associated with blockage of a grille on
A culverted watercourse at Bratton**

In some circumstances however, there will be no other practical option than to keep a culvert in situ and ensure that where possible the impacts of the culvert are mitigated. There are a number of measures that can be adopted to improve the culvert as part of the river system. The following measures may be appropriate, subject to an assessment of the impacts on the hydraulic capacity of the culvert:

- Improving fish passage by reducing flow velocities and increasing water depth
- Making improvements to the inlets and outlets of the culvert
- Improving substrate conditions within the culvert
- Mitigate light conditions within the culvert through the use of light chimneys for culverts over 50m in length

17.5 FLOODING FROM FARMLAND - SUSTAINABLE LAND MANAGEMENT

Whilst the risk of flooding has been shown to be greater in the more urban areas of the Borough, large areas to the north of Telford are made up of rural farmland. Although the majority of this farmland is considered Greenfield, the way the land is managed can have a significant impact on the volume and quality of overland flows produced during large rainfall events.

Modern farming practices can greatly affect the amount and sediment loading of surface water runoff from active farmland. Fields can become compacted by which reduces its permeability and increases the rate of surface water runoff. Fields can also be churned up during ploughing making it easier for particles of soil to be mobilised during rainfall events.



Figure 37 – Effects of Floods with a High Sediment Loading

The impact of this increased sediment loading can cause siltation and blockages on receiving ditches and culverts, and can require significant additional resources to effectively clean an area after a flood event. The farmland itself can be damaged because the floodwater can carry away topsoil and even crops.

TWC will work with land owners to promote sustainable land management practices and where possible provide guidance and advice on managing surface water.

This can be achieved through the use of changes to the type of farming practices such as ploughing fields across gradients, or using low ground pressure tyres to reduce soil compaction. The way the land is managed can also have a significant effect. [The planting of trees](#) and other vegetation is an effective way of increasing surface water attenuation and reducing erosion. Measures to reduce the volume of surface water runoff from farmland can also be used to [protect receiving waters from agricultural pollution](#).

TWC will aim to use its partners in the Strine IDB to contact the wider farming community to promote Sustainable Land Management in areas prone to surface water flooding, thereby reducing flood risk, contributing towards the requirements of the Water Framework Directive and retaining essential nutrients of the land.

If you are affected by flooding from agricultural land, you should in the first instance raise the problem with the farmer concerned. If it is not possible to resolve the issue TWC may be able to assist in the resolution of the issue by reminding the land owner of their riparian responsibilities as set out in Section 15.7.

18. IMPLIMENTATION MONITORING AND REVIEW

18.1 LFRM POLICIES AND ACTION PLAN

The TWC Local Flood Risk Management Strategy has identified a range of actions required to understand, investigate, and address the current and future flooding issues within the Borough. However it is essential that the Strategy is not only implemented in its current state, but that it is also updated when additional information is available or when local and national policy regarding flood risk management is updated. The following action plan identifies TWC LFRM Policies and provides details on how each of the policy statements will be achieved.

18.2 REVIEW PERIODS

In order to ensure that the policies contained in the action plan are achieved each policy has been assigned a review period. TWC will review the progress on each of the policies on either a **6 month** or **12 month** basis.

In addition the LFRM Policy document will also be reviewed in full on a **5 year** basis.

18.3 ACTION PLAN

| Policy 01: | Where appropriate TWC will contact properties shown to be in Floodzone 3 to raise awareness of flooding and increase preparedness | Review Period: |
|-------------------|---|----------------|
| Actions required: | <ul style="list-style-type: none">• Use GIS floodzone property mapping to identify relevant properties;• Create and distribute flood awareness pack for property and business owners located in FZ3;• Work with property and business owners to create property specific flood action plans;• Use information gathered to gain a better understanding of flood risk in the Borough and to identify structures for the Asset Register;• Use information for better justification of capital schemes and provide increased accuracy for bids for future funding applications. | 6 months |

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| Policy 02: | TWC will where possible improve the flood mapping for all ordinary watercourses to better identify properties at risk of fluvial flooding. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Use GIS mapping to identify watercourses that at present have limited or no Floodzone Mapping; • Establish priority catchments for additional mapping based on number of properties know to be at risk or the number of properties within a determined distance from the watercourse channel; • Use information as justification for funding applications for future work. | 12 months |

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| Policy 03: | TWC will investigate any areas where more than 20 properties have been identified at risk of flooding within a 250m² grid square, or where more than 10 properties have been identified at risk of flooding within adjacent 250m² grid squares. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Use GIS to identify appropriate grid squares for Flood Investigation Reports; • Perform desktop analysis of grid squares to remove any modelling anomalies; • Undertake site visits and use GIS based information to identify the potential cause of each identified risk area; • Use information gathered to gain a better of understanding of pluvial flood risk in the Borough; • Identify properties at greatest risk and assist in the creation of property specific flood action plans if required. • Identify critical infrastructure that is performing a flood defence or flood conveyance function in each area and add this to the asset register. • Keep flood incident data up to date and share this information with other Risk Management Authorities • Use information as justification for funding applications for future work. | 12 months |

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| Policy 04: | TWC will continue to work with the owners of reservoirs to ensure that they are managed in line with the updated Reservoirs Act. TWC will produce Emergency On and Off Site Plans for all large raised reservoirs within the Borough. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Contact owner of all reservoirs managed under the Reservoirs act and remind them of their statutory responsibilities for reservoir safety. • Update all onsite emergency plans for reservoirs in TWC ownership and create offsite emergency plans for all reservoirs covered by the Reservoirs Act on a priority basis. • Request and catalogue all 3rd party onsite emergency plans and assist in the creation of these documents where not available. • Work in partnership with other organisations to facilitate the alterations to the Reservoirs Act in line with the requirements of the Flood and Water Management Act 2010. | 12 months |

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| Policy 05: | TWC will aim to gain a better understanding of flooding from ground and mines water in the Borough | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Undertake review of available groundwater flooding information from both partner organisations and private sector. • Obtain available information and add to GIS database. • Undertake analysis of data to identify properties at risk of groundwater flooding in the Borough. • Review existing policies based on additional information. • Use information for better justification of capital schemes and provide increased accuracy for bids for future funding applications. | 12 months |

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| Policy 06: | TWC will ensure that climate change is taken into account in future flood alleviation projects and when checking the suitability of future development proposals within the Borough | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Review all applications for new development and ensure that adequate future climate change has been taken into account based on the potential lifetime of each development. • Work with partner organisations to gain a better understanding of how future climate change will impact on Telford and Wrekin | 12 months |

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| Policy 07: | Any flood event within the Borough affecting 3 or more properties, 2 or more business premises, or lengthy flooding of critical or transportation infrastructure will be deemed “Locally Significant” by TWC. In addition, any single property internally flooded on more than one occasion during a year will also be deemed “Locally Significant”. | Review Period: |
| Actions required: | | Ongoing |

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| Policy 08: | TWC will work with appropriate stakeholders and land owners to investigate any Locally Significant Flood events. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Create standard reporting template for investigations into significant flood events. • Work with partner organisations to improve inter-agency reporting of flood events. • Use information gathered as part of investigations to identify the extent, cause and responsibilities, and options for addressing each flood event. • Use information for better justification of capital schemes and provide increased accuracy for bids for future funding applications. | Ongoing |

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| Policy 09: | TWC will maintain a register of structures and features, both man made and natural, which act to reduce flooding, whether this is their primary purpose or not. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Undertake desktop analysis to identify possible flood defence assets, and undertake site visits to locate and inspect each asset. • Creation, population and maintenance of GIS based register. • Create links between the planning/SAB processes to automatically add all SUDS features to asset register, to include backdated SUDS features on all past development. • Ensure that designation includes SUDS serving single properties to ensure that these can not be altered or removed by subsequent property owners. • Establish internal process for designation of assets, appeals against designation, and enforcement. • All assets to be condition graded using the EA CAM process prior to addition to the asset register. • Establish links between asset register and Council's maintenance responsibilities. • TWC officers will to continue to identify assets during future site investigations or after flood events. • Update and improve the Asset Register and establish effective regimes to share information with other Risk Management Authorities • Use information contained on asset register as justification for funding applications for future work. | Ongoing |

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| Policy 10: | TWC will adopt SUDS features that adhere to the requirements of current Local and National guidance documents. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Use the planning/SAB process to ensure SUDS are provided in every development and located in POS to allow future maintenance. • Continue to update SUDS commuted sum calculator based on specific requirements for individual SUDS features. | Ongoing |

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| Policy 11: | TWC will publish developer guidance in relation to the design and adoption of SUDS in the Borough of Telford and Wrekin | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Prepare SUDS Developer Guidance to provide guidance for developers on the design and adoption process • Seek to achieve multi-beneficial solutions, integrating flood risk management techniques alongside sustainable development and social and environmental benefits to enhance the natural environment | 12 Months |

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| Policy 12: | TWC will require an additional modelling allowance based on housing density on all residential developments to account for the increased areas of hard standing associated with urban creep | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Use planning/SAB process to request and enforce an additional modelling allowance based on housing density for all residential developments. • Create guidance sheet for developers and consultants to explain the background to the additional modelling requirements. • Make information available on the Council's website and for part of any future development guidance documents across the Council. | 6 months |

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| Policy 13: | TWC will work with partner organisations to continue and improve the publication of emergency information via its social media accounts during a flood event. TWC will also promote the following of social media for properties known to be at risk from all sources of flooding. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Work with Corporate Communications team and members of the public to understand what messages work best before, during and after a flood event. • Promote the following of the Council and Environment Agency social media accounts with any property affected by flooding. • Create information pack outlining the various flood warning and social media outlets and how they can be used. These packs can be sent to properties at risk (see Policy 1) and made available at various community events. | 12 months |

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| Policy 14: | TWC will promote the use of Flood Warning Services where applicable. TWC will also aim to establish flood warning services for ordinary watercourses where deemed necessary if financially viable. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Ensure all properties shown to be at risk of fluvial flooding from rivers where existing EA Flood Warning Service is available are aware of and are signed up to the service as part of Policy 1. • Undertake review of all ordinary watercourses and drainage systems within the Borough and identify possible locations for gauge telemetry or other apparatus based on known or possible flood risk to property. • Work with partner organisations to fund and maintain these services. • Use information contained on asset register as justification for funding applications for future work. | 5 Years |

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| Policy 15: | TWC will promote the use of Flood Resilience measures where it is unlikely that large scale flood defence schemes are planned or possible. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Ensure that properties affected by flooding are aware of their roles and responsibilities in protecting their property from flooding. • Raise awareness with property owners of existing guidance into flood resilience products. • Aim – provide free advice for PP Schemes • Work with developers to ensure that flood resilience is built into new development where appropriate, and include relevant information in the SUDS developer guidance documents. | 12 months |

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| Policy 16: | TWC will keep a register of its existing drainage assets and produce Drainage Infrastructure Operation Plans for complex assets. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Work with Environmental Maintenance team to identify list of existing Council owned assets and understand existing maintenance/inspection requirements. • Create DIOP template document for more complex assets. • Identify where DIOP will be required and create document for each specific asset • Establish and maintain joint GIS database with Environmental Maintenance team • Link DIOP's with Flood Risk Asset Register (see Policy 09) • Use information contained in DIOP's as justification for funding applications for future work. | Ongoing |

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| Policy 17: | TWC will aim to cleanse highway gullies on a yearly basis, and cleanse priority gullies on a quarterly basis. Priority will be given to flooding emergencies, and any reported blocked gullies will be cleared within 2 weeks where possible. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Improve collaborative working between TWC highways Drainage team and partner organisations to make better use of available resources. • Manage priority gully list based on known risk and where Flood Investigation Reports (see Policy 3) have identified critical highway infrastructure. • Continue to add highway gully locations onto Council GIS system. • Use information gathered as justification for funding applications for future work. | Ongoing |

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| Policy 18: | TWC will take the lead in consenting appropriate works on Ordinary Watercourses within the Borough unless the works lie within the boundary of the Strine IDB | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Create and maintain TWC website to provide information on consentable activities and the application process. • Manage consenting process to ensure connections and alterations to Ordinary Watercourses are appropriate and will not increase flood risk. • Add and maintain register of locations of all Ordinary Watercourse Consents onto GIS system. | Ongoing |

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| Policy 19: | TWC will contact riparian owners in high risk areas to remind them of their responsibilities and if necessary take enforcement action to ensure that flows are maintained. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Use GIS system to identify potential properties that are riparian owners of watercourses in high risk areas. • Create and distribute information pack for riparian owners explaining in simple terms their roles and responsibilities. This information will also be added to the Council website • Create standard templates for contacting residents found not to be fulfilling their riparian responsibilities, and further define process of enforcement if initial contact is not successful. • Use any information gathered on the condition of watercourses as justification for funding applications for future work. | 12 months |

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| Policy 20: | TWC will assist in disputes between landowners where possible and take enforcement action if an amicable resolution can not be achieved. | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Take a risk based approach when considering the need for enforcement to be taken with regard to repairs, modifications and maintenance of watercourses • Resolve the majority of issues through cooperation with riparian landowners | Ongoing |

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|--------------------------|---|-----------------------|
| Policy 21: | TWC will aim to raise awareness of the risks posed by flooding and methods of reporting with both residents and local business | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Make the public aware of our Local Flood Risk Strategy (LFRMS) and associated responsibilities and procedures through our website, public consultation and awareness events • Engage with communities so as to raise awareness of the drainage assets in their area to assist those communities to be better prepared for future flood events; • Encourage communities to take a more pro-active role in flood monitoring and maintenance works; • Work with local communities which have been affected by flooding to promote local capital schemes to reduce the risk of flooding. | Ongoing |

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|--------------------------|---|-----------------------|
| Policy 22: | Assess development proposals to culvert and actively promote daylighting and de-culverting of watercourses on future development | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Create information pack highlighting the benefits of de-culverting of watercourses. • Raise awareness with developers that this will be required on any site in the Borough where a culverted watercourse is present. • Use planning/SAB process and GIS system to identify culverted watercourses running through development sites. • Use planning conditions to enforce the de-culverting of watercourses in areas of POS • Use information for better justification of capital schemes for de-culverting and provide increased accuracy for bids for future funding applications. | Ongoing |

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|--------------------------|--|-----------------------|
| Policy 23: | TWC will work with land owners to promote Catchment Sensitive Farming | Review Period: |
| Actions required: | <ul style="list-style-type: none"> • Work with bodies such as the NFU and Strine IDB to engage with their members. • Work with landowners to reduce the impact of flooding due to changes in agricultural land management practices. • Use information gathered as part of engagement with land owners as justification of capital schemes and provide increased accuracy for bids for future funding applications. | Ongoing |

APPENDIX 1:

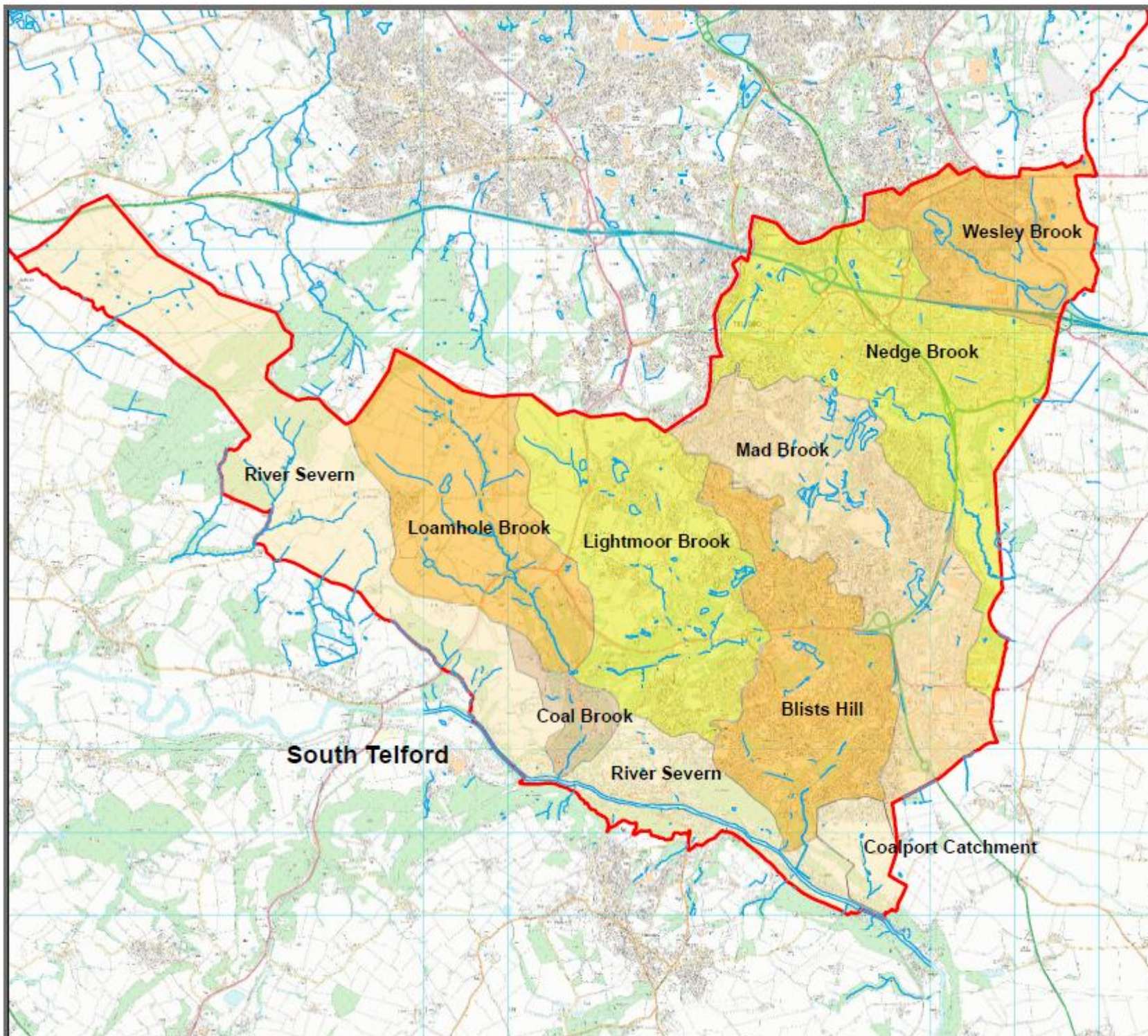
CATCHMENT AREA PLANS

APPENDIX 1 A: SOUTH TELFORD

APPENDIX 1 B: NORTH TELFORD

APPENDIX 1 C: RURAL WEST

APPENDIX 1 D: RURAL EAST



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Project Title: TWC LFRM Strategy

Drawing Title: South Telford Catchment Plan

Fig No: Appendix 1 A

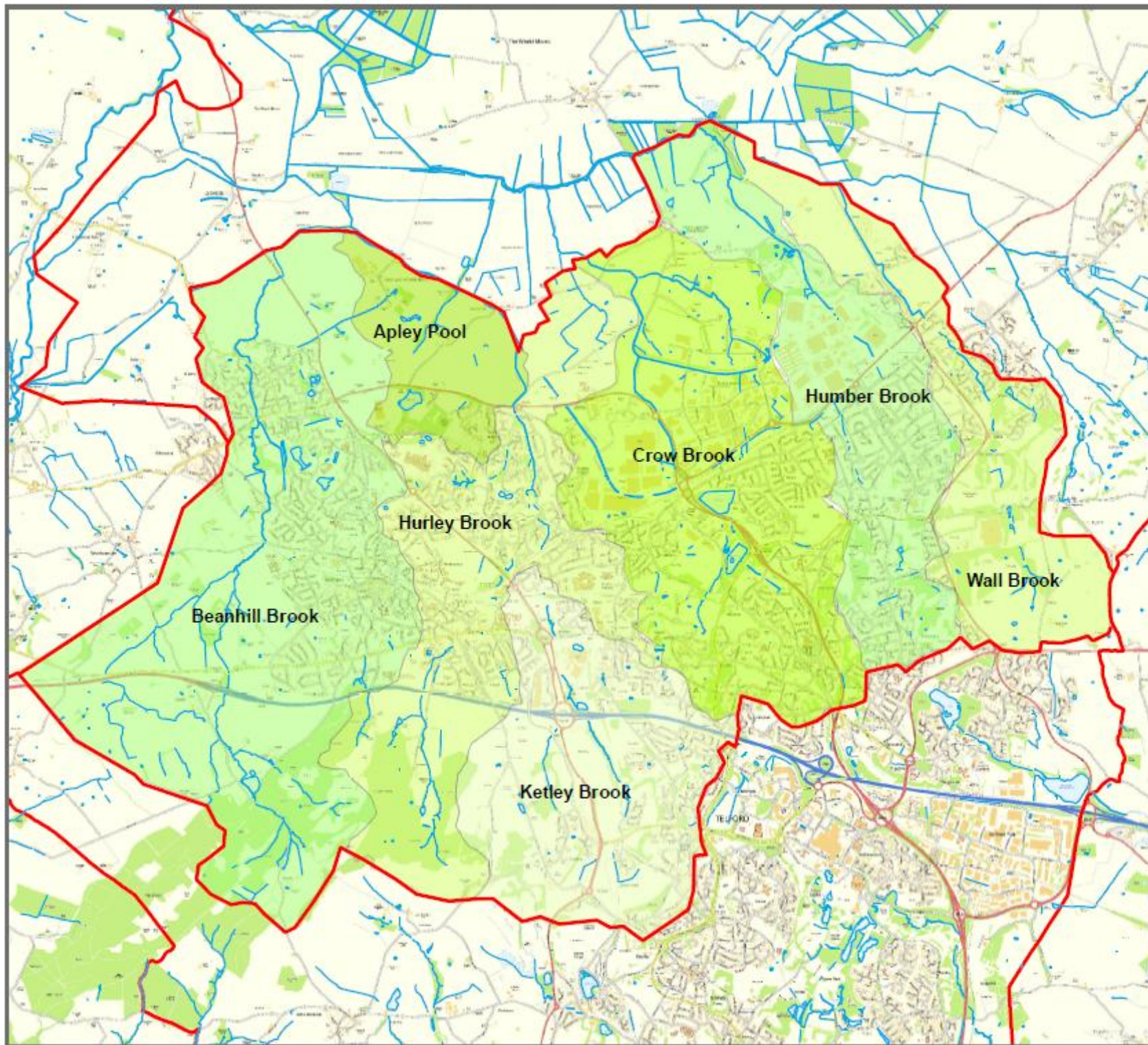
Scale: NTS

Date: 26/03/14

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Telford & Wrekin
COUNCIL



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Project Title: TWC LFRM Strategy

Drawing Title: North Telford Catchment Plan

Fig No: Appendix 1 B

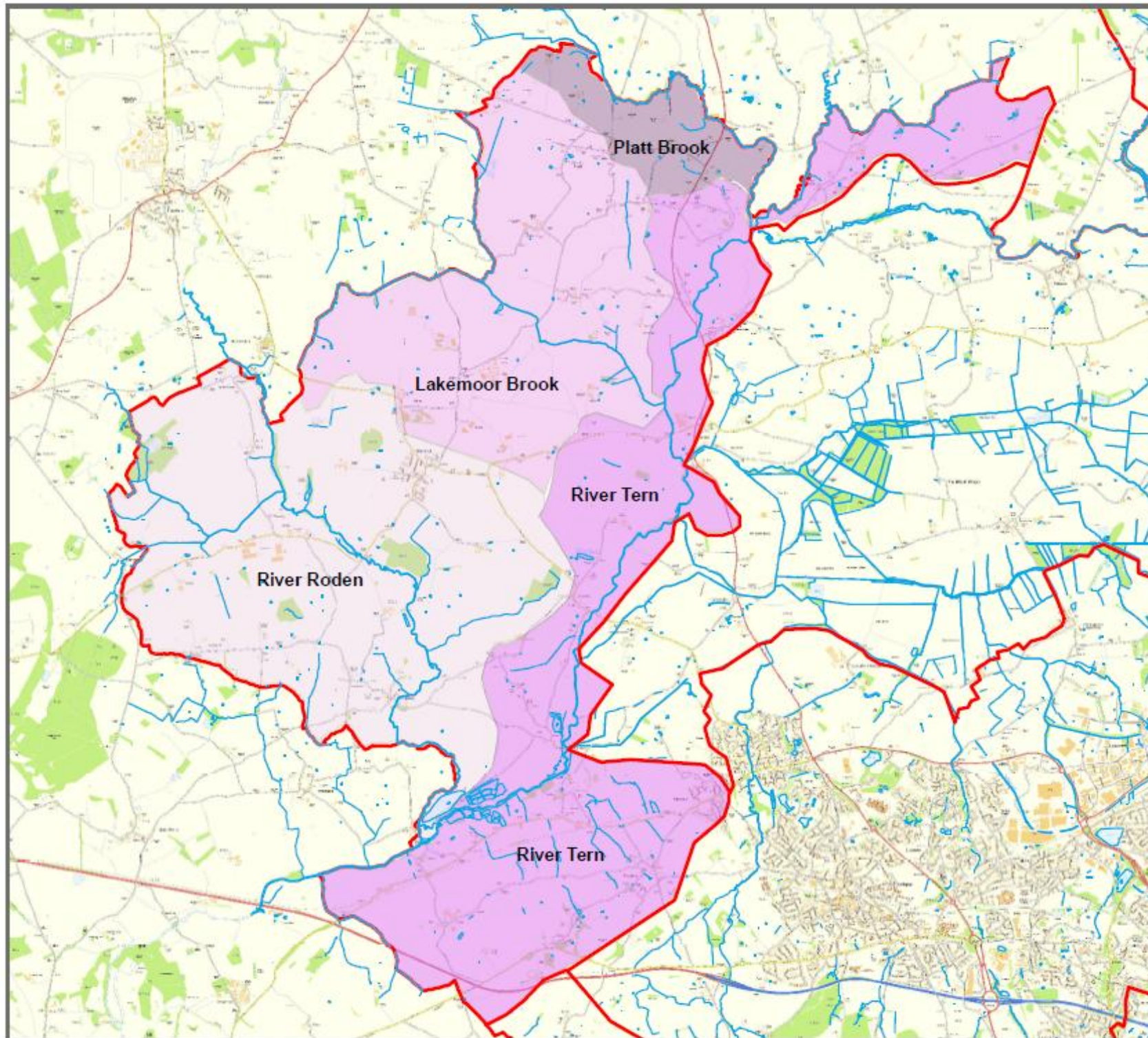
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Project Title: TWC LFRM Strategy

Drawing Title: Rural West Catchment Plan

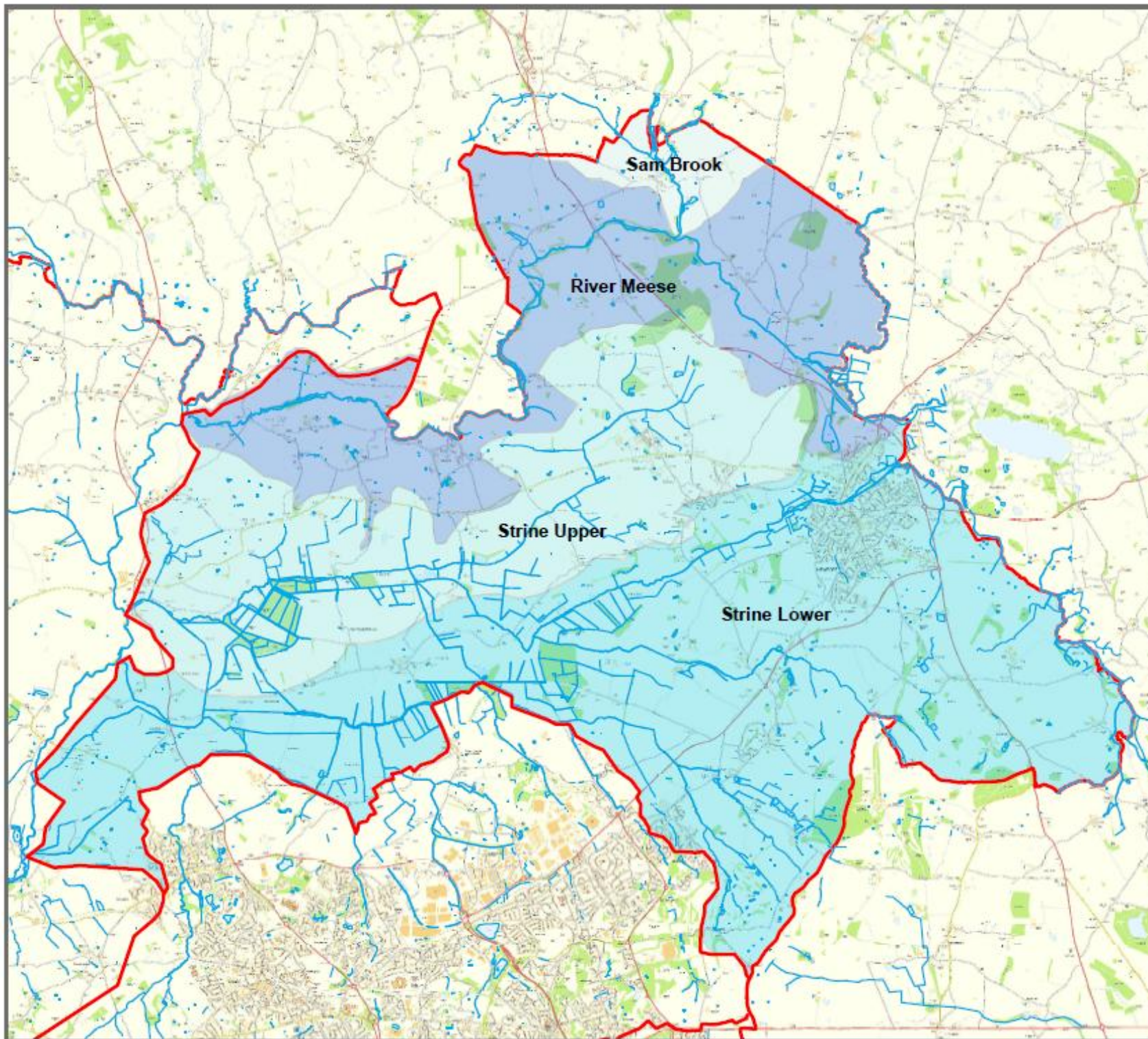
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Project Title: TWC LFRM Strategy

Drawing Title: Rural East Catchment Plan

Fig No: Appendix 1 D

Scale: NTS

Date: 26/03/14

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Telford & Wrekin
COUNCIL

APPENDIX 2:
FLOOD INVESTIGATION REPORT TEMPLATE

TELFORD AND WREKIN COUNCIL

Lead Local Flood Authority

FLOOD INVESTIGATION REPORT

Location:

Date:

EXECUTIVE SUMMARY

(Discuss why the Investigation took place, under whose authority the investigation was authorised and the conclusion of the findings in summary format)

1. INTRODUCTION

1.1. Lead Local Flood Authority Duty to Investigate

Under the Flood and Water Management Act 2010, Telford and Wrekin Council is designated as the Lead Local Flood Authority (LLFA) for the Borough of Telford and Wrekin. This Act sets out a number of responsibilities for the County Council with regard to flooding, including a duty to investigate flood events within its area as it deems necessary:

(1) On becoming aware of a flood in its area, a lead local flood authority must,

To the extent that it considers it necessary or appropriate, investigate:

(a) which risk management authorities have relevant flood risk management functions, and

(b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.

(2) Where an authority carries out an investigation under subsection (1) it must:

(a) publish the results of its investigation, and

(b) notify any relevant risk management authorities.

1.2 SITE LOCATION

(Explain the location of the site. Use a point of reference and preferably a map of the site location)

1.3 SITE CHARACTERISTICS AND DRAINAGE

(Explain any distinguishing characteristics of the site, for example whether it is located within a deep valley catchment and explain how you have identified this i.e. The close grouping of contour lines. Any features both within the built and natural environment that may help identify or affect the site.)

2. DRAINAGE AND FLOOD HISTORY

2.1 PREVIOUS FLOOD INCIDENTS

(Description and list of dates of any previous flood events that impacted upon the site area)

2.2 FLOOD INCIDENT UNDER INVESTIGATION

(Explain the circumstances that culminated from the flooding incident and mention if there were any differing views upon cause, severity or beginning/ end of flood event)

2.3 RAINFALL ANALYSIS

(Statistics of intensity of rainfall, max total and duration of event)

3. PROBABLE CAUSES

(Discuss the potential causes that may have led to increase flooding and disruption)

4. SUMMARY OF IMPACTS AND FINDINGS

(Who and what was affected by the flooding for example people and properties. What was found to be the cause and how does this relate to the impacts reported)

5. RIGHTS AND RESPONSIBILITIES

5.1 LEAD LOCAL FLOOD AUTHORITY

The Flood and Water Management Act 2010 identifies TWC as the Lead Local Flood Authority (LLFA) for the Borough of Telford and Wrekin and as such as responsible for the management of flood risk from ordinary watercourses, surface water runoff, and groundwater.

5.2 ENVIRONMENT AGENCY

(The Environment Agency has powers to undertake flood risk management to main rivers)

5.3 HIGHWAY AUTHORITY

TWC are the Highways Authority for the Borough and are therefore responsible for the operation and maintenance of the Boroughs highway drainage infrastructure.

5.4 WATER AND SEWERAGE COMPANY

(Severn Trent Water are responsible within the Borough of Telford and Wrekin Council)

5.5 RESIDENTS

(Riparian Owners, resident's responsibilities to protect themselves and their properties from the risk of flooding)

6. FLOOD RISK ASSET REGISTERS AND RECORDS

6.1 DUTY TO MAINTAIN A REGISTER

Under section 21 of the Flood and Water Management Act, each Lead Local Flood Authority (LLFA) has to establish and maintain:

- a) a register of structures or features which, in the opinion of the authority, are likely to have a significant effect on flood risk in its area, and
- b) a record of information about each of those structures or features, including information about ownership and state of repair.

The section 21 register is the only public, local source of information which will set out what structures or features are important to the management of flood risk in the LLFA area (e.g. structures that protect the local population against flooding). The asset register will be made available for inspection at all reasonable times, including inspection by the public. To book an appointment to review the asset register, contact the Local Flood Risk Officer by email.

7. OPTIONS

(Provide a range of options to prevent the cause of the flooding within the designated site from occurring again)

8. CONCLUSIONS AND RECOMMENDATIONS

(List what occurred in regards to the causes, impacts and actions to prevent any further flooding events in the near and preferably distant future)

APPENDIX 3:

STRATEGIC ENVIRONMENTAL ASSESSMENT