

**Proposed Decision to be taken by the
Portfolio Holder for Community Safety
on or after 19 December 2014**

Local Flood Risk Management Consultation

Recommendations

1. That the Cabinet Portfolio Holder for Community Safety approves consultation on the Local Flood Risk Management Strategy to commence in early 2015.
2. That the Cabinet Portfolio Holder for Community Safety authorises the Strategic Director for Communities to draft and concurrently consult upon the Strategic Environmental Assessment Scoping Report.

1.0 Key Issues

- 1.1 The Local Flood Risk Management Strategy brings together how flood risk is being managed, and will be managed in the future in Warwickshire. It will bring together various existing arrangements on managing local flood risk, as well as acting as the manifesto for managing local flood risk for the next five years.
- 1.2 The requirement for Lead Local Flood Authorities (LLFAs) to 'develop, maintain, apply and monitor a strategy for local flood risk management in its area' is found in Section 9 of the 2010 Flood and Water Management Act.
- 1.3 Defra and ministers have indicated that Lead Local Flood Authorities should publish draft Strategies by the end of this year. The purpose of this paper, therefore, is to gain approval for the draft Strategy to be published and go to consultation at the end of 2014 or very early in 2015.

2.0 Options and Proposal

- 2.1 Authorise officers to carry out public consultation on the draft Local Flood Risk Management Strategy which includes the draft Surface Water Management Plan, and the associated Strategic Environment Assessment Scoping Report.

3.0 Financial implications

- 3.1 The immediate financial implications of the public consultation are the revenue costs associated with printing costs, press notices and exhibition

display boards. Based on previous consultation exercises within Planning, Development and Flood Risk Management, this will be in the order of £6,000 to £8,000. The Council's Flood Risk Management revenue budget can cover these costs.

4.0 Timescales associated with the decision and next steps

4.1 Public consultation to start at the end of 2014 or very early in 2015.

5.0 Background Papers

None

6.0 Supporting papers

1. The Local Flood Risk Management Strategy draft document and Appendices.
2. The consultation methodology.

	Name	Contact Information
Report Author	Michael Green	michaelgreen@warwickshire.gov.uk 01926 412781 07795 236847
Head of Service	Mark Ryder	markryder@warwickshire.gov.uk 01926 412811
Strategic Director	Monica Fogarty	monicafogarty@warwickshire.gov.uk
Portfolio Holder	Cllr Les Caborn	cllrcaborn@warwickshire.gov.uk



LOCAL FLOOD RISK MANAGEMENT STRATEGY

Warwickshire County Council

Preface

On 25th June 2008, on the first anniversary of the floods of summer 2007, Sir Michael Pitt published his review into what was the biggest peacetime emergency since the Second World War which cost the country around £3.2 billion. At the time of the report going to press twelve months later, many thousands of families were still out of their homes. The Environment Agency estimated that two thirds of the flooding was due to surface water – not water coming out of rivers, but rain water that could not find its way into the rivers before causing chaos to homes, businesses and critical infrastructure.

The Pitt Review, commissioned by the Government, was the most far-reaching to date regarding flooding in the UK. Over a thousand written submissions were reviewed prior to the 500 page report being published. The report concluded with 92 recommendations which Sir Michael Pitt acknowledged to be challenging, and strong leadership would be required to make them a reality. The recommendations included a new role for local authorities to co-ordinate the management of surface water flooding.

Nearly two years after the Pitt Review, the Flood and Water Management Act was passed which attempted to bring into legislation many of its recommendations. In particular, the Act sought:

- to clarify responsibility for different forms of flooding,
- to bring about a new Lead Local Flood Authority role for upper tier county councils and unitary authorities with an oversight role for the Environment Agency, and
- to strengthen controls on spatial planning through new Sustainable Drainage Approval Bodies.

The wide-ranging new role of Lead Local Flood Authority has come at a time of some of the biggest cutbacks ever experienced by local authorities. It is a demanding role, requiring partnership working across a wide range of organisations and specialist areas, strategic planning at a county-wide level, as well as investigating specific flooding incidents as far as possible across the county. In practice, it is not possible to respond to or investigate every flooding incident. Active community involvement is a must in order to effectively manage flooding at a local level, and we are very fortunate to have many flood groups, communities and parish and town councils across the county who are positively engaged in helping to manage their flood risk and to take action if and when the worst happens. We also acknowledge the significant role played by our professional partners, including the Environment Agency, Severn Trent Water and many of our Districts and Boroughs.

Within Warwickshire significant areas are subject to flood risk. Around one in seven commercial properties and one in ten residential properties are at risk of flooding from rivers or surface water. This has a big impact on the local economy and the everyday lives of the people of Warwickshire, with the fear of flooding being greater than the fear of crime in large areas of the county. There are also significant challenges, and opportunities, provided by development.

In response to this, in spite of the need to make £90 million cuts over the next four years, the County Council approved in 2014 an additional £1.1 million for flood alleviation. We have also established a Flood Risk Management team within the County Council.

In managing flood risk, our vision is to work with partners to reduce and mitigate flood risk within Warwickshire, adopting a prioritised, economic and environmentally sustainable approach; we are using our statutory duties and powers to help us achieve this. As Sir Michael Pitt acknowledged in his review of the summer 2007 floods, partnership working is imperative for effectively managing flood risk. This Strategy aims to commit to writing the good partnership working which is already happening across the county and encourage further good practice.

The Strategy is relevant for anyone who lives in, works in or visits Warwickshire to assist them in understanding and managing flood risk. The most pertinent sections in this document are the Executive Summary and Sections 1 and 2 which include the proposed objectives and measures. These sections comprise the Local Flood Risk Management Summary. We have proposed a method for the prioritisation of flooding locations in the Surface Water Management Plan (SWMP) in Appendix C, which will form the risk assessment part of the Strategy. Alongside this Strategy we have the Strategic Environmental Assessment (SEA) Scoping Report published for your comment. This is the first round of consultation, so we are looking forward to receiving your feedback and views in the questionnaire to help us further improve the Strategy, the SWMP and the SEA before the final consultation in summer 2015.

Happy reading!

Cllr Les Caborn

Portfolio Holder for Community Safety

Warwickshire County Council

LOCAL FLOOD RISK MANAGEMENT STRATEGY

Warwickshire County Council

December 2014

Key Contact

Michael Green, Flood Risk and Water Management
Manager, Warwickshire County Council

Warwickshire County Council
PO Box 43
Shire Hall
Warwick
CV34 4RL

flooding@warwickshire.gov.uk

Authors

Michael Green
Richard Stevens
Andy Smith

Table of Contents

Executive Summary.....	7
1 Introduction.....	10
1.1 Aims of the Strategy	10
1.2 What is the area covered by this Strategy?	13
1.3 Who is the Strategy relevant for?	13
1.4 Who has been involved in developing this Strategy?	14
1.5 Period covered by the Strategy	14
2 Strategy for Local Flood Risk Management.....	15
2.1 Objectives of the Strategy.....	15
2.2 Measures.....	19
3 Local Flood Risk in Warwickshire	23
3.1 What is flooding?	23
3.2 Characteristics of Warwickshire.....	24
3.3 Historic Flooding in Warwickshire	24
3.4 Current and Future Flood Risk	25
3.5 Changes to current and future flood risk.....	27
3.6 Existing Flood Risk Management Schemes in Warwickshire.....	31
4 Legislation and Policy	32
4.1 Flood and Water Management Act (FWMA) 2010.....	32
4.2 National Coastal and Erosion Risk Management Strategy for England (NCERMS) (2011)	33
4.3 Other relevant legislation and policies	33
5 Flood Risk Management Roles and Responsibilities.....	35
5.1 Risk Management Authorities.....	35
5.2 Flood Risk Management Partners	40
5.3 Partnerships	44
5.4 Emergency Planning	46
6 Funding.....	48
7 Next Steps	52
7.1 Development of the Strategy	52
7.2 Monitoring.....	52
7.3 Review of the Strategy.....	52

Appendices

Appendix A: Glossary and Abbreviations

Appendix B: Relevant Legislation and Policy

Appendix C: Warwickshire Stage 1 Surface Water Management Plan

Appendix D: Local Flood Risk Management Strategy Action Plan

Appendix E: Warwickshire County Council Flood Investigation Policy

Appendix F: Warwickshire County Council Sandbag Policy

Executive Summary

Significant areas in Warwickshire are subject to flood risk, with around one in seven commercial properties and one in ten residential properties being at risk of flooding from rivers or surface water. Recent flooding events, particularly Easter 1998 and summer 2007, as well as near misses in the winters of 2012/13 and 2013/14, indicate flooding is a significant ongoing risk in Warwickshire. Increased flood risk poses the most significant and specific climate change challenge to the UK economy. It is estimated that flood damages in England have risen by around 60% over the past 25 years and already exceed £1 billion per year in direct costs to communities and business. A significant number of the top risks for business with respect to climate change relate to the impacts of flooding.

Under the Flood and Water Management Act (2010) ('the Act') Warwickshire County Council (WCC) became a Lead Local Flood Authority (LLFA), responsible for managing local flood risk from surface water, groundwater and ordinary watercourses in Warwickshire. One of the new duties placed upon WCC as the LLFA to assist in the management of local flood risk is to 'develop, maintain, apply and monitor' a Local Flood Risk Management Strategy.

This Local Flood Risk Management Strategy ('the Strategy') provides an overview and assessment of local flood risk in Warwickshire, setting out objectives and measures for how WCC will manage and reduce local flood risk. It covers the county of Warwickshire comprising the five local authorities of North Warwickshire, Nuneaton and Bedworth, Rugby, Stratford upon Avon and Warwick.

The Strategy is relevant for anyone who lives in, works in or visits Warwickshire to assist them in understanding and managing flood risk. It is also of relevance to all authorities with flood risk management responsibilities to ensure there is a common understanding of roles and responsibilities. This Executive Summary and Sections 1 and 2 comprise the Summary document of the Local Flood Risk Management Strategy and should normally be read first. This Strategy consultation includes the method for prioritising flooding locations in the Surface Water Management Plan, or 'SWMP' (Appendix C), but it does not yet include the list of prioritised flooding locations – this will be included in the second round of consultation later in 2015. There is also a Strategic Environmental Assessment (SEA) Scoping report for this Strategy which is out for consultation at the same time. The full SEA will be released with the second round of consultation.

To ensure that the Strategy remains relevant and fit for purpose it will be regularly reviewed and updated as necessary. It is important that the information contained within it is the best available and it is in line with national policy on the management of local flood risk.

Our Objectives

A key aspect of this Strategy is the objectives it sets for the management of local flood risk in Warwickshire. These objectives aim to cover all aspects of local flood risk management and are consistent with the national flood risk management strategy.

Table A – Warwickshire Local Flood Risk Management Strategy Objectives

Objective	
O1	To develop a better understanding of local flood risk in Warwickshire

O2	Adopt an economically and environmentally sustainable approach to management of local flood risk in Warwickshire
O3	Adopt a collaborative approach to local flood risk management
O4	Promote community preparedness and resilience to local flood risk
O5	Enable planning decisions to take full account of local flood risk and seek to reduce local flood risk through development

Our Measures

To achieve these objectives, WCC has identified the necessary measures that are presented in the action plan contained within Appendix D of this Strategy. These measures address the various aspects of local flood risk management, including educating communities, raising public awareness, improving our understanding of the risks and implementing measures to manage and reduce flood risk where it is unacceptable. These actions will be led by WCC with support from its partners in local flood risk management where appropriate.

Assessment of Local Flood Risk

The Surface Water Management Plan (SWMP) given in Appendix C is tasked with providing a prioritisation process for future flood risk management work. The SWMP will also form the risk assessment for the County Council's Local Flood Risk Management Strategy (the Strategy).

The SWMP objectives are to:

1. reduce risk to life from flooding;
2. reduce risk of flooding to property (reduces residential and commercial damages);
3. reduce risk of flooding to Critical Infrastructure (such as road and rail networks, hospitals and care homes);
4. identify flood risk management constraints on development / regeneration; and
5. identify opportunities for partnership projects.

Understanding the different sources of flooding and potential interactions and responsibilities between different organisations is important for the study to ensure that a comprehensive understanding of flood risk is obtained, and to identify the most appropriate measures for flood risk reduction. Flood history information was obtained from the following sources.

- Districts and Boroughs, and Parish and Town Councils and community groups;
- Stakeholders and organisations:
 - Environment Agency;
 - Severn Trent Water;
 - Network Rail; and
 - Canal and River Trust.

To develop a comprehensive understanding of surface water flood risk in Warwickshire, it is important to capture where surface water flooding has occurred in the past, but also to identify where surface water flooding may be more likely to occur in the future.

Predictive flood risk information is from the Environment Agency's 'updated Flood Map for Surface Water' (uFMfSW).

To understand which areas are at greater risk, or where there are greater consequences, a series of thresholds have been required to refine the results. These rules will allow the ranking of sites which can be used to identify surface water flooding historic and future 'hotspot' locations and a priority list for further investigation.

Funding the implementation of the Strategy

To implement the measures outlined by this Strategy, funding will need to be sought from a variety of sources. In consultation with its partners in local flood risk management, WCC has identified the following potential funding sources (not exhaustive):

- Flood and Coastal Erosion Risk Management (FCERM) Grant in Aid;
- Local Levy;
- Section 106 developer contributions;
- Community Infrastructure Levy (CIL);
- WCC contributions;
- other Local Authority contributions;
- other partner contributions;
- Local Enterprise Partnership (LEP) contributions.

1 Introduction

The aims of Warwickshire County Council (WCC) with respect to the management of local flood risk within the county are embodied within the following vision statement. This vision provides the overriding direction for the Strategy.

Warwickshire Flood Risk Management Vision Statement

To work with partners to reduce and mitigate flood risk within Warwickshire, adopting a prioritised, economic and environmentally sustainable approach.

The County Council is using its statutory duties and powers to help it achieve its vision. A key aspect of this is partnership working, and an overarching aim of this Strategy is to further clarify and develop good practice across the county.

This introductory section (**Section 1**) looks in more detail at why we are producing a Strategy for managing local flood risk and what it aims to achieve. Following this introductory section the Local Flood Risk Management Strategy document is structured as follows.

- **Section 2** sets out our strategy for local flood risk management in Warwickshire, with objectives and measures to achieve this.
- **Section 3** outlines our current understanding of local flood risk in Warwickshire and how it may change in the future.
- **Section 4** sets out legislation and policy documents that are relevant to the Strategy.
- **Section 5** summarises the roles and responsibilities of key partners and other organisations involved in local flood risk management in Warwickshire.
- **Section 6** sets out the potential sources of funding for implementation of the measures set out in this Strategy.
- **Section 7** explains what will happen next, setting out how the Strategy will be in monitored and reviewed.

The Executive Summary, this Section and Section 2 comprise the Summary document of the Local Flood Risk Management Strategy and these sections should normally be read first.

1.1 Aims of the Strategy

This Strategy provides an overview and assessment of local flood risk, setting out objectives and measures for how WCC will manage and reduce local flood risk.

The Strategy must be consistent with the national Flood and Coastal Erosion Risk Management (FCERM) strategy, produced by the Environment Agency in September 2011. The Flood and Water Management Act ('the Act') also requires that the Strategy must specify the following.

-
- The risk management authorities in the county.
 - The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the county.
 - The assessment of local flood risk for the purpose of the Strategy.
 - 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.
 - How and when the Strategy is to be reviewed.
 - How the Strategy contributes to the achievement of wider environmental objectives.

Figure 1.1 illustrates how the Strategy relates to other plans and policies.

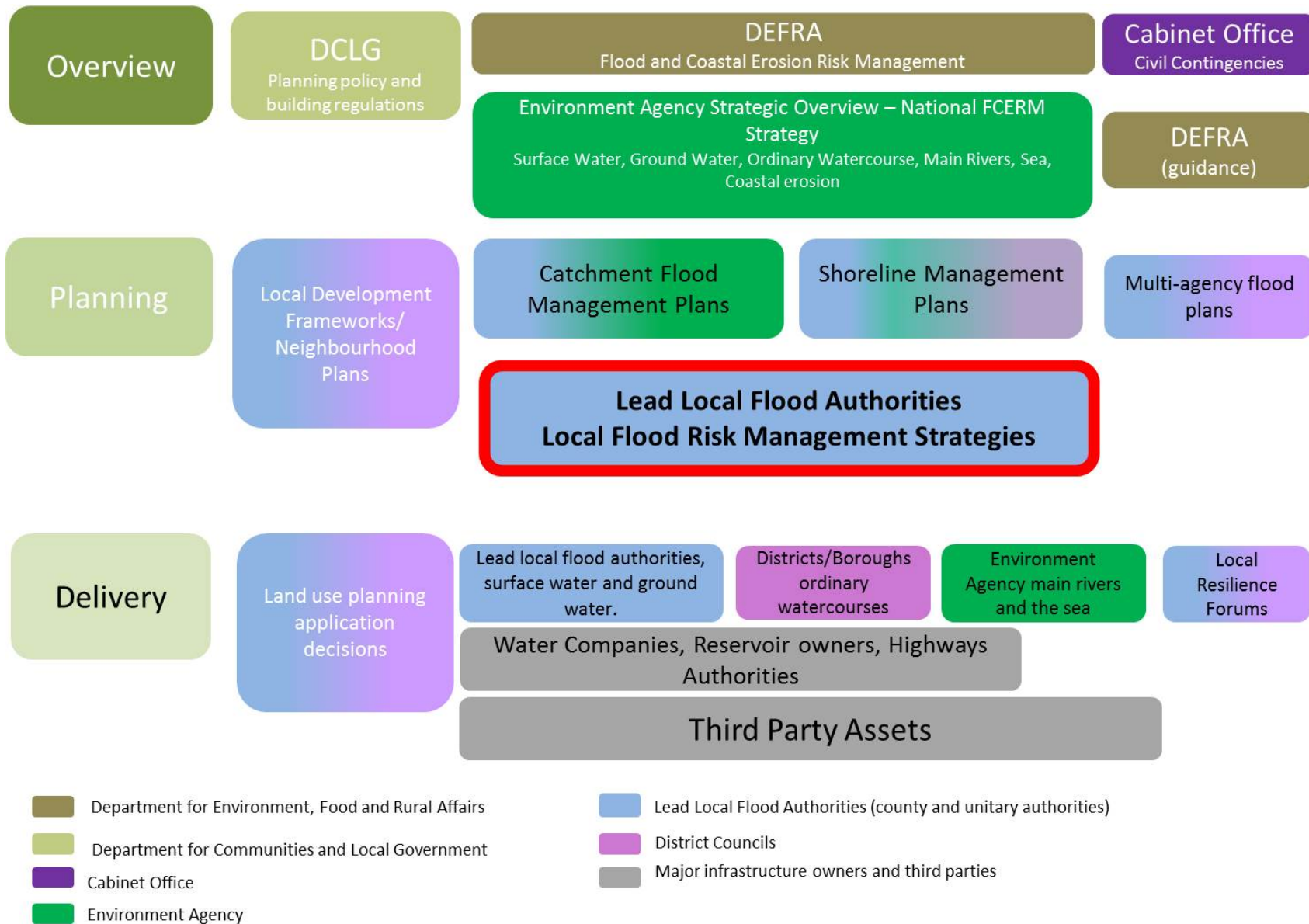


Figure 1.1: Flood Risk Management Plans and Polices

1.2 What is the area covered by this Strategy?

This Strategy covers the county of Warwickshire, comprising the five local authorities of North Warwickshire, Nuneaton and Bedworth, Rugby, Stratford upon Avon and Warwick. Figure 1.2 shows the county of Warwickshire with the five local authority areas.

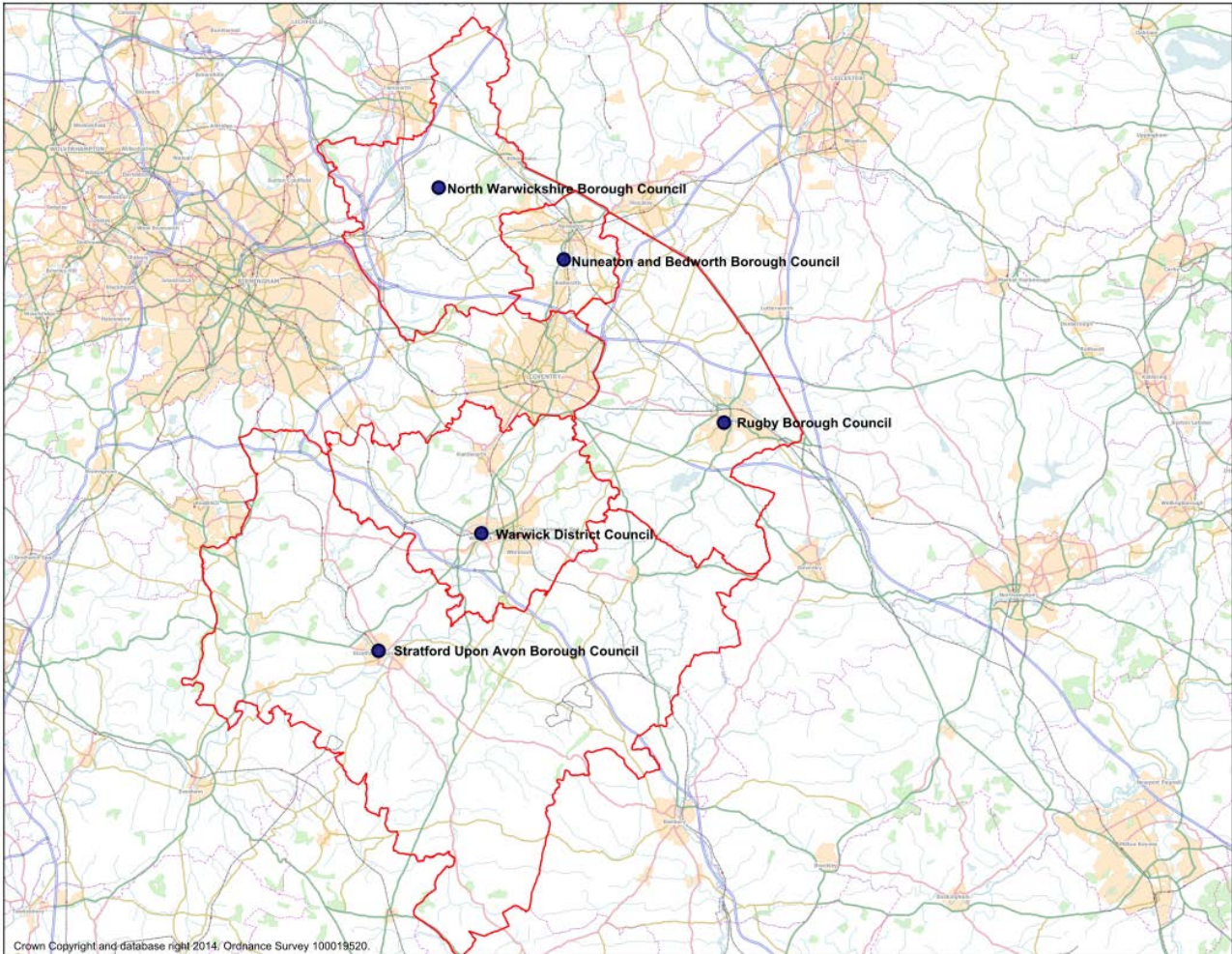


Figure 1.2: Warwickshire County Council Administrative Area

1.3 Who is the Strategy relevant for?

The Strategy is relevant for anyone who lives in, works in or visits Warwickshire to assist them in understanding and managing flood risk. It is also of relevance to all authorities with flood risk management responsibilities in Warwickshire to ensure there is a common understanding of roles and responsibilities within Warwickshire. They must also have due regard for this Strategy when delivering their own flood risk management services.

1.4 Who has been involved in developing this Strategy?

To assist in the development of the Strategy, WCC has undertaken county-wide engagement meetings. These have involved district and borough councils, town and parish councils and community groups. Their aim was to gather local information on flood risk and encourage local communities to take an active role in managing local flood risk at a local level. In addition assistance has been provided by neighbouring LLFAs, sharing best practice where they have already developed their strategies.

1.5 Period covered by the Strategy

To ensure that the Strategy remains relevant and fit for purpose, it will remain a live document and an annual refresh will be provided. It is important that the information contained within it is the best available and it is in line with national policy on the management of local flood risk.

Triggers for review of the Strategy may include the following.

- Significant flood events that alter our understanding of flood risk in Warwickshire.
- Significant policy changes that affect the role of Flood Risk Management Authorities.
- Publication of significant new flood risk information and mapping.

The Strategy will be reviewed after five years, or beforehand (such as if one of the above triggers takes place) at the discretion of the WCC Portfolio Holder for flooding.

2 Strategy for Local Flood Risk Management

2.1 Objectives of the Strategy

To support the strategic vision for the management of local flood risk in Warwickshire, the following five objectives have been developed to support the delivery of the Strategy (see Table 2.1). These are based on the objectives and measures originally presented at the January 2013 Warwickshire Strategic Flood Forum, and have been developed to be consistent with the objectives of the national FCERM strategy and to drive local flood risk management in Warwickshire. They are discussed in detail in the following sections.

Table 2.1 – Warwickshire Local Flood Risk Management Strategy Objectives

Objective	
O1	Develop a better understanding of local flood risk in Warwickshire
O2	Adopt an economically and environmentally sustainable approach to management of local flood risk in Warwickshire
O3	Adopt a collaborative approach to local flood risk management
O4	Promote community preparedness and resilience to local flood risk
O5	Enable planning decisions to take full account of local flood risk and seek to reduce local flood risk through development

2.1.1 Objective 1: Develop a better understanding of local flood risk in Warwickshire

A clear understanding of local flood risk is crucial to ensuring that it can be effectively managed. This involves understanding where flooding may occur, how frequently it may happen and what impact it may have.

Developing this understanding is an ongoing process, whereby information is recorded about flooding events and these events are then investigated. The County Council have developed an approach for the prioritisation of flood investigations to ensure that flooding events which have had the most significant impact are assessed first (see Box 1 – further detail is provided in Appendix E).

In addition, knowledge will be increased through improved modelling of flooding from local sources. The ongoing Surface Water Management Plan (SWMP) will make a significant contribution to this objective.

As part of the county-wide SWMP, local intelligence on flooding locations across the county has been gathered through county-wide engagement meetings so that these flooding locations can be prioritised on the basis of historic flooding, as well as using surface water flood risk modelling outputs to ascertain potential future flooding.

With local flood risk expected to increase due to climate change, greater understanding will enable Warwickshire to plan for the future, mitigating against potential problems and advising strategic development plans.

Box 1 – Flood Investigation Prioritisation

Through careful consideration and consultation with fellow LLFAs, WCC have developed the following thresholds for prioritisation of flooding events and as such, the order in which we will investigate. These thresholds follow closely the areas of locally significant flood risk outlined in the WCC Preliminary Flood Risk Assessment (PFRA) of 2011, and these thresholds determine what will be termed historic flooding ‘hotspots’ in the SWMP (see Appendix C).

1. Flooding that poses a threat to the safety of the public or may directly result in serious injury or death.
2. Five or more residential properties internally flooded.
3. One or more commercial property internally flooded.
4. One or more piece of critical infrastructure affected that impacts on the wider area.
5. Flooding that places vulnerable individuals or vulnerable communities at risk e.g. hospitals, care and nursing homes, schools, secure units, etc.
6. Additionally, where one or more residential property has flooded internally from the same source on five or more occasions within the last five years.

The LLFA team may investigate flooding outside these categories, but only when all outstanding issues with a higher priority have been considered. These investigations will be prioritised based on the same six criteria listed above. Flooding on public land outside of the above categories will be addressed before flooding to residential gardens and on private land. Although inconvenient and possibly distressing to the individual, flooding to private land is fundamentally a land drainage issue involving adjacent landowners that will be dealt with by the LLFA team on an advice basis only. Landowners may contact the Agricultural Land Tribunal to settle disputes over, amongst other matters, land drainage (see Appendix E). Smaller scale flooding affecting the highway or coming from the highway will continue to be investigated primarily by WCC Highways, with support from the LLFA team and Districts and Boroughs where land drainage issues exist.

These guidelines set numerical thresholds. However, in recognition of the fact that all floods will be different, a certain amount of discretion will be required in order to implement this policy effectively.

2.1.2 Objective 2 - Adopt an economically and environmentally sustainable approach to management of local flood risk in Warwickshire

Where opportunities are available to implement measures to reduce local flood risk these will be explored to establish if they are economically viable and can form part of a sustainable approach to local flood risk management in Warwickshire. These will be prioritised to ensure that the most beneficial measures are implemented first. This is especially important where budgetary constraints mean that not all viable measures can be implemented.

In the current economic climate quick wins will be sought to make best use of the available budgets to give the best value for money in actions taken to reduce local flood risk.

Where local flood risk issues are identified, all available funding sources will be explored to progress potential solutions in partnership with other authorities. In developing measures to tackle local flood risk, it is important to involve all relevant partners, both risk management authorities and others, including members of the public.

Another key aspect of local flood risk management is working with riparian landowners to ensure they act on their responsibilities for watercourse maintenance. WCC Highways have produced a leaflet entitled 'Farming and the Public Highway' which is freely available on the WCC website and gives advice to rural landowners regarding their responsibility for maintenance of drainage ditches and watercourses adjacent to the highway.

Management of local flood risk also includes actions taken when flooding is occurring. WCC has a sandbag policy which sets out the principles and procedures for the distribution of sandbags across Warwickshire during flood events (Appendix F).

2.1.3 Objective 3 - Adopt a collaborative approach to local flood risk management

Collaboration between professional partners and stakeholders is a key aspect of the Flood and Water Management Act 2010 and the national strategy. Similarly, it is a vital part of local flood risk management; the Warwickshire Strategic Flood Forum for example brings together all the relevant authorities and some other key partners to ensure collaborative flood risk management across the county.

In 2014 the first annual Flood Summit was held in Warwickshire to allow partners and stakeholders to review the progress made towards delivery of the recommendations of the Pitt review (see Box 2).

Box 2 - Warwickshire Flood Summit

A Flood Summit was held on the 16th October 2014, in Benn Hall in Rugby. It was attended by more than 90 delegates, representing partners and stakeholders in Warwickshire to 'take a step back' and consider to what extent the recommendations of Pitt Review have been implemented in Warwickshire, and which direction WCC should be taking in the future in terms of flooding. The event was chaired by County Councillor Les Caborn, the Portfolio Holder for Community Safety, and included a number of guest speakers including Mary Dhonau OBE, who is Chair of The Flood Protection Group Property Care Association and Chief Executive of the Know Your Flood Risk Campaign, and Graham Knott, who is Regional Director for AECOM and their national Water Resources Practice Lead.

Communication of local flood risk and raising awareness with local communities is another important element of local flood risk management. An example of this is the Defra-funded Community Flood Resilience Pathfinder Project currently being undertaken by WCC in partnership with the National Flood Forum. This project has allowed WCC to work closely with local communities: nine flood action groups have been created, seven county-wide

engagement workshops have been held, and local flood risk management and flood resilience has been promoted at a number of schools in areas affected by flooding.

2.1.4 Objective 4 - Promote community preparedness and resilience to local flood risk

While WCC as the LLFA has a big role to play in the management of local flood risk, it is important that communities are prepared to deal with flood events if they happen and are best placed to recover as quickly as possible.

An improved understanding of local flood risk from the measures outlined under Objective 1 will allow Warwickshire to advise local communities, ensuring they are aware of the risks they face and enabling them to take appropriate action when necessary. Increased awareness can be achieved through public consultation events, newsletters and online resources. Box 3 describes some of the work WCC has already undertaken to improve understanding in local communities.

Community resilience and preparedness needs to be supported by the plans and arrangements of the relevant authorities to respond to flooding. The Warwickshire Multi-Agency Flood Plan (MAFP) has been developed by the Coventry, Solihull & Warwickshire Resilience Team (CSWRT) in liaison with the Environment Agency, Police, Fire and Ambulance services. It sets out appropriate multi-agency arrangements to facilitate an effective, coordinated response to flooding in Warwickshire.

Box 3 - Community Engagement in Warwickshire

Seven county-wide engagement meetings with Parish and Town Councils and community groups took place in Baddesley Ensor, Nuneaton, Lapworth, Kenilworth, Stratford, Aston Cantlow and Warwick in 2014, to discuss community flood resilience and encourage local communities to take an active role in managing local flood risk at a local level with support from Warwickshire County Council and the Districts and Boroughs of the county. The meetings were for community leaders and members of Parish and Town Councils across the county.

The Defra-funded Flood Resilience Community Pathfinder project aims to develop a truly community-led approach to flood resilience. The Warwickshire County Council Flood Risk and Water Management (FRM) team, in association with the Coventry, Solihull and Warwickshire Resilience Team (CSWRT) have also been working with schools in Bedworth and Shipston-on-Stour as part of the ongoing Community Flood Resilience Pathfinder project. A weather station has recently been installed at both schools, and further installations are planned at other school sites within the county. This will help in monitoring local rainfall and assist in early warning of potential flooding in these communities. This project has also helped to raise awareness of potential flooding in these communities and to raise awareness of the need for individuals and communities to be prepared for unexpected extreme rainfall events.

2.1.5 Objective 5 - Enable planning decisions to take full account of local flood risk and seek to reduce local flood risk through development

The planning process has a significant role to play in ensuring that new developments do not increase flood risk and ensuring that they are not at risk from flooding. In order to ensure new development is safe and does not have detrimental impacts on local flood risk, particularly in areas of known flood risk, it should ideally be considered at the pre-application stage and the relevant flood risk management authorities should be involved in these discussions.

The National Planning Policy Framework is the key piece of legislation that sets out the requirements for managing flood risk in new development. This sets out the requirement that the planning process should be informed by the Strategic Flood Risk Assessment (SFRA) at all stages.

Currently, as part of the planning process the five District and Borough Councils often seek specialist flood risk and drainage advice from the WCC FRM team. WCC as LLFA (a non-statutory consultee) review major planning applications from a surface water flooding perspective on a prioritised basis and often recommend planning conditions are included as part of the any approved planning consent. This often includes a condition that maintenance of any Sustainable Drainage Systems (SuDS) feature is provided for and that the SuDS will be maintained for the life-time of the development.

Following a key recommendation of the 2008 Pitt Review, Schedule 3 of the Flood and Water Management Act (2010) would designate WCC as the SuDS Approval Body (SAB). If this enactment becomes legislation, WCC would be responsible for approving all construction with drainage implications and adopting any approved SuDS features. Defra and the Department for Communities and Local Government (CLG) released a consultation on 12th September 2014 which outlined an alternative way of delivering SuDS through amendments to existing planning system. Depending on the outcome of this consultation, the SAB may not be necessary and the Local Planning Authorities may have the duty to approve SuDS systems for new developments. There would be several options available to the Local Planning Authorities on how they obtain approval for SuDS. This alternative to the SAB could possibly be brought into force during spring 2015. At this stage WCC is not in a position to adopt any private SuDS features. Therefore, in the interim, should a SuDS solution be proposed for developments, it should be confirmed prior to commencement of works who the responsible organisation for SuDS maintenance will be for the lifetime of the development. The future role of the FRM team with respect to commenting on planning applications is subject to this current SuDS consultation and whether funding streams become available.

WCC actively seeks to secure and use Section 106 contributions from developers to fund flood risk management measures in the communities affected by the development.

2.2 Measures

To enable the objectives of this Strategy to be met, this section details a range of measures that will be undertaken. Measures to manage flood risk comprise more than building flood alleviation schemes, and the maintenance and management of watercourses and drainage assets. They also include educating communities to be prepared for flooding, effective

partnership working between the various agencies that hold flood risk management responsibilities, and effective use of the planning system, among others.

2.2.1 'No Regrets' Measures

While this Strategy has developed a range of measures for the management of local flood risk in Warwickshire, the development and implementation of such measures is an integral part of the work of the County Council through its role as the Lead Local Flood Authority (LLFA).

The WCC FRM team have developed a range of 'no regrets' measures that comprise actions that the County Council and our partners have already undertaken and are currently doing and should continue to do to effectively manage local flood risk in Warwickshire. While these measures could have been delayed until the completion of this Strategy, doing so would have jeopardised the County Council's chances of accessing some sources of funding and progressing flood alleviation schemes in what are known to be areas of high flood risk. These will be funded through existing revenue and capital grant funding, subject to available resources and funds.

The 'no regrets' measures include the following.

- Leading on and assisting in the completion of flood alleviation schemes where there are clearly identified flood risk management issues (such as in Aston Cantlow, Weddington, Polesworth, etc.).
- Managing flood risk through the development process through supporting local authorities in reviewing planning applications and consenting work that impacts on ordinary watercourses.
- Continuing to improve knowledge on local flood risk through flood investigations and development of a Surface Water Management Plan (SWMP).
- Quick win small-scale flood risk management schemes such as minor highway works.
- Bidding for funding allocations for flood alleviation schemes (such as in Snitterfield, Fenny Compton, Ladbrooke, Broadwell, Cherington, etc.).
- Engagement with flooded communities, in particular through the Community Flood Resilience Pathfinder project.
- Solving minor drainage systems blockages during investigative work.

The completion of the county-wide SWMP and this Strategy may alter some of the existing priority locations and this will be reflected in bids for funding allocations and the progression of flood alleviation schemes in the future.

2.2.2 Measures to Achieve Strategy Objectives

In order to meet the objectives of the Strategy a range of longer term measures will be undertaken. These are set out for each of the five objectives in the following sections and further details of how these measures will be implemented are given in the Action Plan which supports the Strategy in Appendix D.

Objective 1: Develop a better understanding of local flood risk in Warwickshire

- Measure 1A: Further develop the Surface Water Management Plan for the county.
- Measure 1B: Work with partners to investigate locally significant flooding incidents and identify sources, pathways and receptors of flooding.
- Measure 1C: Further develop and continue to maintain a register of flood risk management assets with a record of the significant structures with respect to flood risk, together with details of ownership and state of repair and where appropriate the designation of such structures or features, which may affect flood risk.
- Measure 1D: Review the Preliminary Flood Risk Assessment as required by the EU Floods Directive and Flood Risk Regulations 2009 and contribute to the other requirements.

Objective 2: Adopt an economically and environmentally sustainable approach to management of local flood risk in Warwickshire

- Measure 2A: The actions of the emerging SWMP to be progressed and, where suitable, flood risk management schemes are identified, funding to be sought.
- Measure 2B: To work with partners to encourage flood management activities by riparian landowners of ordinary watercourses and flood defence structures, as well as limiting the development of constrictions on ordinary watercourses through consenting and, if necessary, enforcement.
- Measure 2C: To work with partners to encourage flood schemes by third parties, riparian landowners and stakeholders.
- Measure 2D: To lead on the implementation of local flood risk management schemes and to work with partners to best utilise funding obtained through a prioritised risk-based approach.

Objective 3: Adopt a collaborative approach to local flood risk management

- Measure 3A: To continue to develop the Warwickshire Strategic Flood Forum (WSFF) and relations with other partners.
- Measure 3B: To share knowledge and training opportunities with partners.
- Measure 3C: Continue to work with and support community flood action groups, Town and Parish Councils and other community groups.
- Measure 3D: Continue to engage local communities, building on the progress made by the Community Flood Resilience Pathfinder Project.
- Measure 3E: To work with neighbouring Lead Local Flood Authorities to ensure a catchment-based approach to local flood risk management.

Objective 4: Promote community preparedness and resilience to local flood risk

- Measure 4A: To work with partners to reduce the impacts of flooding by enabling an efficient response to flooding incidents from partners and stakeholders.
- Measure 4B: To work with partners to reduce the harmful consequences of local flooding to communities and human health through pro-active actions, community activities and education programmes that enhance preparedness and resilience to local flood risk, thereby promoting community cohesion and minimising community disruption.
- Measure 4C: Continue the work of the Warwickshire Community Flood Resilience Pathfinder project in supporting local groups to manage local flood risk and increase the resilience of their communities to flooding.
- Measure 4D: Continue to improve communications and advice given during flooding events.
- Measure 4E: To work with partners to establish a co-ordinated approach to the provision of temporary flood risk management measures.

Objective 5: Enable planning decisions to take full account of local flood risk and seek to reduce local flood risk through development

- Measure 5A: To work with partners to produce local policies and guidance and set standards to promote a positive impact on flood risk from new development, and to minimise any potential negative impact on flood risk from new development.
- Measure 5B: To maximise opportunities for contributions towards flood risk management from new development to address existing local flood risk.
- Measure 5C: Develop byelaws where beneficial to control development.
- Measure 5D: Work with relevant partners to promote SuDS measures for new developments, the exact scope of which is dependent upon the outcome of Defra and CLG's current SuDS consultation.

3 Local Flood Risk in Warwickshire

3.1 What is flooding?

Flooding is often defined by where the flood water comes from; Warwickshire is affected by flooding from a variety of different sources. This Strategy is focussed on local flooding which is defined as flooding from surface water, groundwater and ordinary watercourses. The different sources of flooding that may affect the county are set out below.

Surface water flooding: High intensity rainfall causes surface water runoff which flows over the ground and accumulates in low-lying areas.

Groundwater flooding: Water in the ground rises up above the ground surface due from within permeable rocks often as a result of prolonged or heavy rainfall.

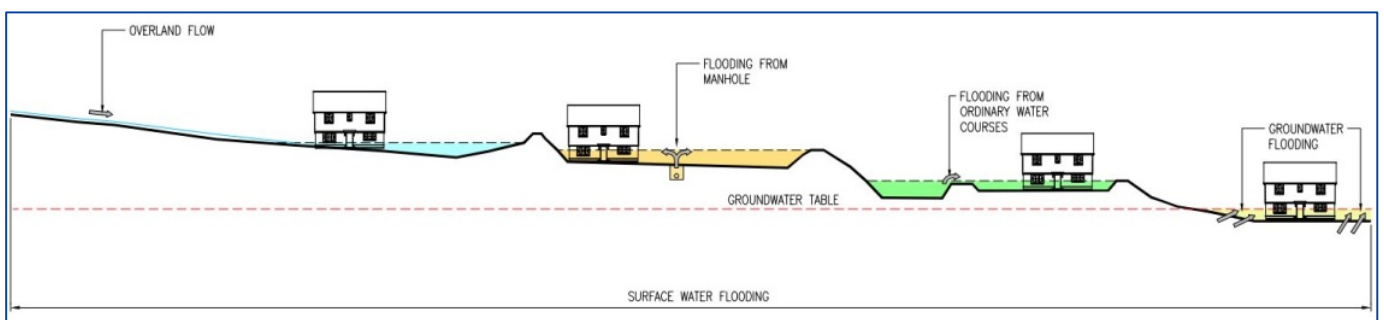
Ordinary watercourse flooding: When a watercourse (not designated as Main River) cannot accommodate the volume of water flowing in it or the channel becomes blocked, causing water to come out of the channel and flow over the surrounding land.

Sewer flooding: The sewer network cannot cope with the volume of water entering it or a problem occurs in the system, such as a blockage or collapse. Once the capacity of the sewer is exceeded, sewage flows out of the network through manholes and drains leading to flooding.

Highway flooding: Heavy rainfall or overflow from blocked drains and gullies causes water to pond on the carriageway.

Main River flooding: When the capacity of a river (designated as Main River) is exceeded or the channel becomes blocked, causing water to spill onto the floodplain.

Reservoir flooding: When a reservoir overtops or the dam is breached causing the water stored by the reservoir to be released.



3.2 Characteristics of Warwickshire

Warwickshire is a land-locked county in the West Midlands with an administrative area of 1,975 km². It is bounded by Oxfordshire and Gloucestershire to the south, Worcestershire and Birmingham to the west, Staffordshire and Derbyshire to the north, and Leicestershire and Northamptonshire to the east. The county is split into five Borough and District authorities.

There are nine main towns within the county: Stratford-upon-Avon, Warwick, Leamington Spa, Kenilworth, Rugby, Nuneaton, Bedworth, Polesworth and Atherstone. The majority of the population is located in the north and centre of the county, while the southern part of the county is largely rural.

The majority of the county has gently rolling topography interspersed with low lying river valleys including the Rivers Avon, Stour, Anker and Tame. Most of the county is underlain by impermeable clay, and lies within the River Avon catchment, which drains into the River Severn. However the Rivers Tame and Anker that drain north Warwickshire are within the River Trent catchment, while a small area in the south of the county drains into the River Thames catchment.

There are a number of main rivers and ordinary watercourses within Warwickshire that present a risk of flooding, these include the River Alne, Anker, Arrow, Avon, Blythe, Cole, Dene, Itchen, Leam, Sowe Stour, Swift and Tame.

In addition to flooding issues generic to urbanised areas, having significant rural areas Warwickshire is also at risk of surface water flooding in towns, villages and on the highway as a result of run-off from agricultural land.

Due to a changing climate the risk of flooding within Warwickshire may increase as extreme rainfall events become more common and peak flood flows in rivers are expected to increase.

3.3 Historic Flooding in Warwickshire

Our understanding of past flooding in Warwickshire had been collected as part of several previous studies.

- Warwickshire County Council (WCC) Strategic Flood Risk Assessment for Local Development Framework – Level 1 (February 2008).¹
- Stratford-on-Avon DC, Warwickshire CC, North Warwickshire BC & Rugby BC Level 1 Strategic Flood Risk Assessment (September 2013).²
- Warwickshire Preliminary Flood Risk Assessment (May 2011).³
- Draft Warwickshire Surface Water Management Plan (2014).

The information on historic flooding is summarised in the following sections. However it is not intended to provide a complete list of all flood events or areas affected by flooding, but rather

¹ <http://www.warwickshire.gov.uk/sfra>

² <http://www.warwickshire.gov.uk/sfra>

³ <http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/research/planning/135534.aspx#11>

an indication of the main flood events that have occurred in the past. Further details can be found in the documents outlined above.

3.3.1 Surface Water Flooding

Surface water flooding has occurred across the county in the past, and often occurs in combination with other sources, such as sewers and watercourses. A review of previously published information shows that there have been a number of notable flood events in Warwickshire in recent times. Significant events include; January 1992, Easter 1998, August 1999, June 2005, June/July 2007, December 2008 and November 2012, with near misses in winter 2013/14. All of these events have been attributed in part to surface water flooding.

3.3.2 Groundwater

There are limited records of groundwater flooding in Warwickshire. Where it has occurred, this has been in combination with multiple other sources of flooding after periods of sustained rainfall. The Warwickshire PFRA noted only one groundwater flood event that has been recorded in isolation, related to a major redevelopment beside existing properties. In addition, the Easter 1998 flood event is thought to have been caused in part by groundwater flooding.

During the winter of 2013/14, some flood events are suspected to have been the result of groundwater flooding, although this has not been confirmed. During this period, groundwater levels were high, and groundwater flooding was reported at several isolated locations across the county.

3.3.3 Fluvial Flooding

Fluvial flooding (from rivers including ordinary watercourses) has occurred on a significant scale in Warwickshire in the recent past; the most significant events were Easter 1998 and Summer 2007 when thousands of properties were flooded.

3.4 Current and Future Flood Risk

The information and records on historical flooding in Warwickshire give some indication of the areas that are at risk. However, this does not indicate all areas that may be at risk of flooding now or in the future. To understand this risk fully we make use of the results of computer modelling.

The Environment Agency has undertaken modelling of flood risk from Main Rivers for some time. However, until recently little focus has been placed upon other sources of flooding. In recent years other sources of flooding such as surface water, ordinary watercourses and groundwater have received more attention, but the level of detail of these assessments has not yet reached that which is now routine for Main Rivers. The following sections outline the best available information on current flood risk from local sources in Warwickshire.

3.4.1 Surface Water and Ordinary Watercourse Flooding

The Warwickshire Preliminary Flood Risk Assessment (PFRA) (2011) determined that, at the time of publication, the Environment Agency's Flood Map for Surface Water (FMfSW) was the most appropriate source of information on surface water flood risk and identified it as the 'Locally Agreed Surface Water Information' for the county.

Since publication of the PFRA, the Environment Agency has published the Risk of Flooding from Surface Water map in December 2013 (the updated Flood Map for Surface Water, or uFMfSW). At present this is the best available data for defining the current risk from surface water flooding in Warwickshire. Although these maps primarily represent surface runoff, they can also be used to identify flooding from ordinary watercourses. As they are produced at the national scale these maps are suitable for identification of broad areas of risk; they are not appropriate for identification of risk at the property level.

The County Council is now in the process of producing a Surface Water Management Plan (SWMP) for Warwickshire. This is currently using the Risk of Flooding from Surface Water map and records of historic flooding to identify surface water flood risk hotspots. The SWMP will provide an improved understanding of surface water flood risk at key locations and identify specific measures to reduce or mitigate the risk it identifies. The SWMP will form the assessment of local flood risk for the purpose of the Strategy. The draft Stage 1 SWMP for Warwickshire is included as Appendix C to this Strategy.

3.4.2 Groundwater Flooding

The current level of understanding of groundwater flood risk is limited due to the complexities of predicting groundwater flow and emergence. At present there is no mapping available which shows groundwater flood risk and existing approaches have focused on representing the potential susceptibility of an area to groundwater flooding.

The Environment Agency has produced the Areas Susceptible to Groundwater Flooding (AStGWF) map which indicates potential risk at a strategic scale. However this data should only be used in combination with known records of groundwater flooding to establish areas of groundwater flood risk.

The AStGWF maps are based upon the British Geological Survey's (BGS) Susceptibility to Groundwater Flooding mapping; the BGS mapping is of higher resolution and quality. The BGS mapping is only available when purchased under licence. However, this is considered the best current dataset for assessing groundwater flood risk.

3.4.3 Main River Flooding

Although this Strategy is focused on local flood risk, there can be significant interaction between these sources and Main Rivers in Warwickshire during flood events. This is most apparent when high river levels limits the ability of water to drain from the land, leading to surface water, sewer, highway and ordinary watercourse flooding.

3.4.4 Sewer Flooding

Although this Strategy is focused on local flood risk, there can be significant interaction between these sources and the sewer infrastructure.

Water and Sewerage Companies (WaSCs) are currently required to report their performance each year against performance indicators called levels of service indicators. These indicators cover the basic service that consumers expect to receive. One of these is flooding from sewers, commonly referred to as the DG5 record.

The DG5 register is an Ofwat reportable schedule of properties known to have suffered from rainfall related sewer flooding. It does not hold information about flooding from operational incidents.

Mitigation measures (e.g. non-return valves) are used to prevent future flooding but often only capacity improvements can remove a property from the DG5 register.

This data can be used to identify locations where there are issues with sewer capacity that has resulted in flooding to properties. The responsible water companies in Warwickshire are Severn Trent Water for the majority of the county, and Thames Water for a small part in the south of the county.

As part of their agreed business plan with Ofwat, WaSCs are required to undertake work to reduce sewer flooding identified on the DG5 register as part of their asset management programme.

3.5 Changes to current and future flood risk

Flood risk in Warwickshire is likely to change for a range of reasons including climate change, new development, urbanisation, rural land use, farming practices and maintenance and/or deterioration of flood risk management assets.

3.5.1 Climate Change

There is clear scientific evidence that global climate change is happening now. Over the past century the UK has experienced rising sea levels, more winter rain has fallen in intense wet spells and seasonal rainfall is highly variable. Some of the changes might reflect natural variation; although the broad trends are in line with projections from climate models. The effects of flooding in the future may be made more severe due to the impact of climate change, especially if nothing is done in relation to the risks.

The latest UK climate projections (UKCP09)⁴ indicate that the greenhouse gas levels in the atmosphere are likely to cause higher winter rainfall in the future, with predictions of potentially three times as many days in winter with heavy rainfall (more than 25mm in a day) by the 2080s. The amount of rain in extreme storms (with a 1 in 5 annual chance or rarer) could also increase by 40%.

⁴ <http://ukclimateprojections.metoffice.gov.uk/21678>

Increased flood risk poses the most significant and specific climate change challenge to the UK economy. As stated in the 2012 UK Climate Change Risk Assessment Government Report⁵, a significant number of the top risks for business with respect to climate change relate to the impacts of flooding.

The predicted impact of climate change on flood risk in England is set out in the Environment Agency’s ‘Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities’⁶. This translates the predictions of UKCP09 into quantified impacts on peak river flood flows and extreme rainfall which both affect local flood risk.

The impact upon peak river flows is provided on a regional basis by River Basin District and Warwickshire is located across three districts; the Humber, Severn and Thames. The predictions for the potential impact of climate change on peak river flows in these districts are given in Table 6.1 below.

Table 6.1: Predicted Impact of climate change on peak river flood flows

River Basin District	Total potential increase by 2080s
Humber	20%
Severn	25%
Thames	25%

The impact of climate change on extreme rainfall intensity is less certain and therefore predictions regarding the potential impacts are only made at a national scale. Extreme rainfall intensity is expected to increase by 20% by the 2080s.

More intense rainfall will increase the risk of surface water flooding through increased runoff that drainage systems are unable to cope with. This, combined with rising river levels, will increase local flood risk through interactions with smaller watercourses as well as larger rivers.

3.5.2 Urban Creep

Not all development is subject to planning procedures or the development control process, and therefore its impact on flooding are less likely to be controlled. Urban creep such as property extensions is an example of this. This increases the amount of hard surfaces in towns, reducing the ability of water to filter into the ground and increasing the volume of water that has to run off into drains. In addition, it increases the peak flows within the surface water drainage system. This can increase the risk of surface water flooding in urban areas as drainage systems are unable to cope with the increased demand.

⁵ <https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report>

⁶ <http://webarchive.nationalarchives.gov.uk/20131108051347/http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/geho0711btzu-e-e.pdf>

Retrofitting Sustainable Drainage Systems (SuDS) into existing urban environments is a potential approach to combatting this increase in local flood risk. WCC is currently working with Severn Trent Water to assess the potential retrofitted SuDS measures. Attenuation water butts that partially self-drain to allow for some storage for rainfall attenuation have been trialled. When used in combination in high numbers across a catchment this research has shown that they could help to reduce flood risk. One such trial has recently been completed by Severn Trent Water in south Warwickshire.

3.5.3 New Development

New development has the potential to increase surface water runoff through new impermeable hard surfaces that reduce the ability of rainfall to soak into the ground. Unless managed, this can increase the volume of runoff, potentially increasing surface water flood risk.

The National Planning Policy Framework (NPPF) and its associated guidance require new developments to be designed such that they do not increase local flood risk. This includes provision of adequate drainage infrastructure to ensure surface water runoff is appropriately managed.

As part of the implementation of the Flood and Water Management Act 2010, Defra and CLG are developing an approach which will require the use of Sustainable Drainage Systems (SuDS) in new developments with associated National Standards for SuDS.

While new development should not increase flood risk off-site, there may be occasions when areas of land are currently subject to flooding, but have yet to be developed. These would not be locations of priority investigation by the County Council, since there is currently low flood risk due to the absence of buildings, for example. Such situations where known flooding exists should be investigated by the Developer in order to avoid any increase in flood risk due to the construction of new potential receptors of flood water. The Developer should determine the source, i.e. overland flooding caused by unmaintained ditches, unauthorised outfalls discharging to ditches/watercourses. This may include investigation of drainage systems to establish their structural status and whether the removal of debris or blockages is needed. If these investigations involve highway and/or public sewers, then authorisation should be obtained from the appropriate authority. It may be necessary in some instances to undertake a wider investigation involving a catchment assessment. Depending on the outcome of the investigations, the developer may present the findings to the planners or the organisation responsible for the source of the flooding. Equally, the Local Planning Authority may seek contributions or choose a Section 106 agreement to ensure that improvement works are undertaken.

WCC also actively seeks that new development offers betterment with regard to flood risk in order to mitigate the potential negative flood risk impacts of development.

3.5.4 Land Use Planning

There are a number of major development proposals that are currently being progressed in Warwickshire. As these are implemented this will significantly affect the distribution of population across the county. To ensure that these changes do not result in an increase in

local flood risk the evidence base used to make planning decisions must take account of this risk.

Some of the major developments that are currently being progressed include:

- Coventry/Warwickshire Gateway (Major employment development including offices, industrial uses and warehousing);
- Rugby Mast (6200 new homes and 31 hectares of employment land);
- St Modwen/Rugby College (770 homes).

Another aspect of land use planning that affects local flood risk is the management of farmland and rural catchments. Natural Catchment Management techniques are approaches to manage landscapes so that they capture and store rainfall before it reaches watercourses, or slowing down the flow of water towards major rivers. This can include the re-forestation of open land, or using woody debris in small watercourse to slow down the flow. A local flood action group in Shipston is currently exploring the potential for implementing these types of measures in partnership with local landowners, the Woodland Trust and the EA. The aim is to slow the flow of run-off from the land around the village by using small bunds to store water and reforestation in the longer term.

3.5.5 Maintenance and Deterioration of Assets

As flood risk management assets age and deteriorate, their ability to perform the function for which they were designed will reduce. How this occurs will depend upon the type of asset: for example, drains may silt up, or ditches and culverts may become blocked with rubbish, other debris or vegetation growth reducing their capacity to convey water. As their capacity decreases, so will their ability to remove surface runoff, resulting in an increase in surface water flood risk.

Assets such as flood walls and embankments weaken over time and are less able to withstand the forces of the water they are designed to hold back. Solid walls may crack and deform over time, while embankments may suffer deterioration from root damage, animal burrows or soil erosion.

Routine maintenance such as cleaning drains, removal of trash from ditches and culverts, and vegetation management can mitigate the risk of assets failing and extend their lifetime. Without a programme of maintenance and where necessary asset replacement and remediation, the deterioration of flood risk management assets would increase local flood risk over time.

To ensure adequate maintenance can be carried out, an established programme of asset inspection and surveys is required to monitor asset condition and assess the level of maintenance required. This can involve visual inspections of above ground assets such as ditches, walls and embankments, or CCTV surveys of culverts and drainage pipes. It is the responsibility of the owners of flood risk management assets to undertake such inspection and maintenance.

3.6 Existing Flood Risk Management Schemes in Warwickshire

Risk management authorities in Warwickshire are continually involved in flood risk management schemes to alleviate known or existing risk within the county. Below are details of recent schemes that have been completed. These are part of the 'No Regrets' measures described in Section 2.2.

- WCC has led on and assisted in the completion of flood alleviation schemes, working closely with partners, in: Weddington; Polesworth; Gaydon; Marlcliff (Environment Agency led); Cubbington (Warwick District led); and Five Ways, Haseley.
- WCC has been successful in finding solutions to frequent flooding problems through informal flood and drainage investigations across the county. For example, in Western Road, Stratford-upon-Avon, working in partnership with WCC Highways, the Canal and River Trust and other landowners, investigations highlighted maintenance issues which have been dealt with by the local landowners.
- The Trent Regional Flood and Coastal Committee allocated funding for the inspection of culverts in the north of Warwickshire which is being managed by WCC.
- WCC has supported Severn Trent Water in recently delivering £22 million of flood alleviation in Leamington Spa.
- WCC is currently undertaking appraisal studies to inform future flood risk management schemes in places such as Fenny Compton, Cherington, Ladbroke, Pailton and Princethorpe.

4 Legislation and Policy

It is important that the Strategy is developed with due regard for relevant legislation and flood risk management policy. The key relevant legislation and policy documents in the context of the Strategy are summarised in the following sections.

4.1 Flood and Water Management Act (FWMA) 2010

Sir Michael Pitt carried out an independent review of national flood risk management practices after the widespread floods during the summer of 2007. This review called for fundamental changes to the way flood risk was being managed. It contained 92 recommendations, of which 21 were specifically aimed at Local Authorities and focused on them playing a major role in the management of local flood risk, through co-ordination with other relevant authorities.

Many of the recommendations contained within the Pitt Review were implemented within the Flood and Water Management Act (FWMA), which came into force in April 2010. The Act provides the legislation for the management of risks associated with flooding and reinforces the need to manage these risks holistically and in a sustainable manner.

It placed a number of new roles and responsibilities on WCC which is designated as a Lead Local Flood Authority (LLFA). As the LLFA, WCC is responsible for managing local flood risk; which includes flooding from surface water runoff, ordinary watercourses and groundwater. More detail on these responsibilities and those of others are discussed in Section 5.

The FWMA 2010 specifies a number of 'risk management authorities' (RMA), which for Warwickshire are as follows.

- The Lead Local Flood Authority (Warwickshire County Council).
- The Environment Agency.
- The local water company (Severn Trent Water).
- District and Borough Councils (North Warwickshire Borough Council, Nuneaton and Bedworth Borough Council, Rugby Borough Council, Stratford-on-Avon District Council & Warwick District Council).
- The highway authority (Warwickshire County Council and the Highways Agency).

The Act also places high importance on the value of co-operation between these authorities to manage flood risk. It also stresses the need for cross-border co-operation in flood risk management as flood water does not respect administrative boundaries. This is particularly relevant for Warwickshire which sits in the catchments of the Rivers Severn, Trent and Thames.

4.2 National Coastal and Erosion Risk Management Strategy for England (NCERMS) (2011)

A requirement of the Flood and Water Management Act 2010 was for the Environment Agency to produce a strategy for flood and coastal erosion risk management in England. The strategy was published in 2011 and is available from their [website](#)⁷.

The national strategy aims to ensure that flood risk is managed in a co-ordinated way within catchments and that this balances the needs of communities, the economy and the environment. The strategy encourages more effective risk management through enabling people, communities, business, infrastructure operators and the public sector to work together towards the following objectives.

- Understanding the risk of flooding and coastal erosion, and working together to develop long term plans to manage these risks and ensuring other plans take account of them.
- Avoiding inappropriate development in areas of flood and coastal erosion risk, and ensuring development does not increase these risks.
- Building, maintaining and improving flood and coastal erosion risk management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society.
- Increasing public awareness of the risk that remains and engaging with people at risk to make their property more resilient.
- Improving the detection, forecasting and issuing of flood warnings, planning for and co-ordinating a rapid response to flood emergencies, and promoting faster recovery from flooding.

Local flood risk management strategies must be consistent with the national strategy and must therefore be in accordance with the following six guiding principles of the national strategy.

- Community focus and partnership working.
- A catchment 'cell' approach.
- Sustainability.
- Proportionate, risk-based approach.
- Multiple benefits.
- Beneficiaries should be allowed and encouraged to invest in local risk management.

4.3 Other relevant legislation and policies

Further information on other relevant legislation and policy documents is provided in Appendix B. This does not cover every piece of legislation that is related to the management of local flood risk but is intended give an appreciation of those which are most relevant. The legislation and policy documents covered in Appendix B are listed below.

⁷ <https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england>

Legislation

- Flood Risk Regulations 2009
- The Land Drainage Act 1991
- Water Resources Act 1991
- The Localism Act 2011
- Highways Act 1980
- Civil Contingencies Act 2004
- Reservoirs Act 1975
- Habitats Directive (The Conservation of Habitats and Species Regulations) 2010
- Water Framework Directive 2000

Policy

- River Basin Management Plans
- Catchment Flood Management Plans
- Planning Policy
 - National Planning Policy Framework
 - District and Borough Local Plans
 - Strategic Flood Risk Assessments
 - Preliminary Flood Risk Assessment

5 Flood Risk Management Roles and Responsibilities

In order for WCC to be effective in managing local flood risk it is important that the roles and responsibilities of the key parties involved in its management in Warwickshire are clearly defined.

5.1 Risk Management Authorities

The Flood and Water Management Act (FWMA) 2010 requires the Strategy to specify the relevant Risk Management Authorities (RMA) in the Lead Local Flood Authority's area and the flood risk management functions that those RMAs may exercise.

5.1.1 Warwickshire County Council as Lead Local Flood Authority

As the Lead Local Flood Authority (LLFA) for Warwickshire, Warwickshire County Council (WCC) are required to develop a strategy to tackle local flood risk, involving flooding from surface water, ordinary watercourses and groundwater. In order to undertake this role effectively the County Council has established a Flood Risk Management team which currently has 7.5 full time equivalent posts. This includes two posts being hosted through the Defra-funded Community Flood Resilience Pathfinder project, although it is anticipated that these will continue after the completion of the project, being part-funded by the County Council and part-funded by partners.

WCC's key duties and responsibilities, once all elements of the Flood and Water Management Act 2010 have been implemented, include the following.

1. LLFAs such as WCC are classed as Risk Management Authorities, or RMAs (FWMA Section 6).
2. In exercising its flood and coastal erosion risk management functions, WCC must act in a manner which is consistent with the national strategy and associated guidance, and also act in a manner which is consistent with local strategies and associated guidance. In exercising any other function in a manner which may affect a flood risk or coastal erosion risk, WCC must have regard to the national and local strategies and guidance (FWMA Section 11).
3. Co-operation with other RMAs in the exercise of its flood and coastal erosion risk management functions. WCC may share information with another risk management authority for the purpose of discharging its duty in exercising their Flood and Coastal Erosion Risk Management functions. In addition, they may arrange for a flood risk management function to be exercised on its behalf by another risk management authority or a navigation authority (FWMA Section 13).
4. Developing, maintain and applying, in consultation with key stakeholders, a Local Flood Risk Management Strategy for Warwickshire which will consider risks from surface water run-off, groundwater and ordinary watercourses (FWMA Section 9).
5. Establishing local management and governance arrangements with other key stakeholders to ensure delivery of effective joined up management of flood risk.

Responsibility for the co-ordination of flood risk management across the county (FWMA Section 9).

6. Fulfilling the requirements of the EU Floods Directive by completing a Preliminary Flood Risk Assessment (Flood Risk Regulations 2009).
7. Approving, adopting and maintaining Sustainable Drainage Systems (SuDS) that meet National Standards for development (FWMA Schedule 3 – not yet enacted and Defra and CLG are currently consulting on an alternative approach for delivery of SuDS for new development).
8. Establishing and maintaining a register of flood risk management assets with a record of each structure which has a significant effect on flood risk, together with details of ownership and state of repair and where appropriate the designation of such structures or features, which may affect flood risk (FWMA Section 21).
9. Investigating flooding incidents, to the extent the LLFA considers necessary, in order to understand their cause and ensure that appropriate agencies play their role in the effective management of flooding incidents and recovery (FWMA Section 19).
10. Consenting and enforcement on ordinary watercourses (under Sections 21, 23 and 25 of the Land Drainage Act) (FWMA Schedule 2).
11. Power to request a person to provide information in connection with the LLFA's flood and coastal erosion risk management functions (FWMA Section 14).
12. LLFAs are classed as designating authorities under Schedule 1 of the Act. This allows LLFAs, where the conditions outlined in Schedule 1 are satisfied, to designate a structure or a natural or man-made feature of the environment where the authority thinks that the existence or location of the structure or feature affects a flood risk or a coastal erosion risk. The effect of designation is that a person may not alter, remove or replace a designated structure or feature without the consent of the responsible authority. Consent is provided through notices and Schedule 1 outlines enforcement powers and powers of entry that can be used to fulfil the requirements of Schedule 1 (FWMA Schedule 1).
13. LLFAs may carry out flood risk management work if the authority considers the work desirable having regard to the Local Flood Risk Management Strategy for its area under section 9 or 10 of the Flood and Water Management Act 2010, and the purpose of the work is to manage a flood risk in the authority's area from surface runoff or groundwater. Flood risk management work includes works to maintain, improve and construct flood defences (FWMA Schedule 2 – Amendment of Land Drainage Act 1991).
14. They may make byelaws to secure the efficient working of a drainage system in the authority's area, to secure the effectiveness of flood risk management work within the meaning of section 14A and/or to secure the effectiveness of works done in reliance on Section 38 or 39 of the Flood and Water Management Act 2010 (FWMA Schedule 2 – Amendment of Land Drainage Act 1991).

5.1.2 Warwickshire County Council as Highways Authority

Warwickshire County Council (WCC) as Highways Authority is responsible for the provision and management of highway drainage under the Highways Act (1980). This excludes motorways and trunk roads (M6, M40, M42, M69, A5, A46, A446 and the A45) that are the responsibility of the Highways Agency.

WCC as Highways Authority has various duties and powers in relation flooding and drainage on the highway. They are not responsible for flooding and drainage on private land. Where flooding of the highway occurs due to the actions of another person (e.g. adjoining landowners) the Highway Authority can take action against the person responsible. The owners of land adjoining a highway have a common law duty to maintain ditches to prevent them causing a nuisance to road users.

WCC's key duties and responsibilities as the Highways Authority include the following.

1. Responsibility to maintain highways, including ensuring that highway drainage systems are clear and that blockages affecting the highway are cleared. This is a duty under the Highways Act.
2. Powers to deliver works that they consider necessary to protect the highway from flooding. These works can either be on the highway itself or on land which has been acquired by the Highway Authority through the exercise of highway acquisition powers.
3. The Highway Authority may divert parts of watercourses or carry out any other works on any form of watercourse if it is necessary for the construction, improvement or alteration of the highway or provides a new means of access to any premises from the highway.

5.1.3 Water and Sewerage Companies

Water and sewerage companies are responsible for managing the risks of flooding from water supply and foul, combined or surface water sewer systems. This may need to be carried out in partnership with others, for example, working with developers and landowners to reduce the input of rainfall into sewers through attenuation, storage and sustainable drainage.

Public sewers are designed to protect properties from the risk of flooding in normal wet weather conditions. However, in extreme weather conditions there is a risk that sewer systems can become overwhelmed and result in sewer flooding.

The main water company for Warwickshire is Severn Trent Water who deals with the majority of surface water sewer and foul water management in the county. Thames Water also has a small area of responsibility in the southern part of the county in Stratford-upon-Avon District.

5.1.4 The Environment Agency

The Environment Agency is responsible for the management of flood risk from the sea, main rivers and reservoirs. It has a strategic overview role for all forms of flooding in addition to

responsibilities for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas.

Main rivers are watercourses shown on the statutory main river map held by the Environment Agency and Defra, and shown on the Flood Map for Planning available from the Environment Agency's [website](#)⁸. The Environment Agency has permissive powers to carry out works to maintain, improve and construct flood defences on main rivers. This can include any structure or appliance for controlling or regulating flow of water into or out of the channel. The overall responsibility for maintenance of main rivers, however, lies with the riparian owner.

The Environment Agency is the lead organisation responsible for all flood and erosion risk management around the coastline of England, including tidal flood risk. The Environment Agency leads the country in developing a coastal management plan that works at local, regional and national level, with partner organisations, including local authorities, putting agreed plans into practical action. The Environment Agency supports this by giving Grant-in-Aid funding and overseeing the work carried out.

The Environment Agency enforces the Reservoirs Act 1975, which is the legislation for reservoirs in the United Kingdom. Although the responsibility for safety lies with the reservoir owner, the Environment Agency is responsible as Enforcement Authority of reservoirs in England and Wales. The Environment Agency is responsible for establishing and maintaining a register of reservoirs, and making this information available to the public.

As Enforcement Authority the Environment Agency must ensure flood plans are produced for specified reservoirs. The Environment Agency is responsible for controlling works which affect main rivers and flood defences through consenting works under the Water Resources Act 1991 and their Land Drainage and Sea Defence Byelaws.

As statutory consultee on all flooding and drainage matters, the Environment Agency is responsible for providing advice to planning authorities. It is also responsible for providing fluvial and coastal flood warnings, monitoring flood and coastal erosion risks and supporting emergency responders when flooding occurs.

In its role to provide a strategic overview of all sources of flood risk, the Environment Agency provides the following.

- Advice to Government on flood and coastal erosion risk, supporting future national responses, policy and strategy.
- Supervision of flood and coastal erosion risk management.
- Allocation of flood and coastal erosion risk management capital funding.
- Support to LLFAs by providing data and guidance on assessing, planning and carrying out flood risk management for flooding from ordinary watercourses, surface runoff and groundwater.

⁸ <http://apps.environment-agency.gov.uk/wiyby/37837.aspx>

5.1.5 District and Borough Councils

Warwickshire County is a two tier county and comprised of the following five Local Authorities.

- North Warwickshire Borough Council.
- Nuneaton and Bedworth Borough Council.
- Rugby Borough Council.
- Stratford-on-Avon District Council.
- Warwick District Council.

Responsibilities of District and Borough Councils under the Flood and Water Management Act 2010 include the following.

- Districts and Boroughs are classed as Risk Management Authorities, or RMAs (FWMA Section 6).
- In exercising their flood and coastal erosion risk management functions, Districts and Boroughs must act in a manner which is consistent with the national strategy and associated guidance, and also act in a manner which is consistent with local strategies and associated guidance. In exercising any other function in a manner which may affect a flood risk or coastal erosion risk, they must have regard to the national and local strategies and guidance (Section 11).
- Co-operation with other RMAs in the exercise of their flood and coastal erosion risk management functions (Section 13).
- In exercising a flood or coastal erosion risk management function, Districts and Boroughs must aim to make a contribution towards the achievement of sustainable development (Section 27). Under planning legislation, Borough and District Councils operate their development planning and control functions, having due regard to the National Planning Policy Framework and associated technical guidance.
- Districts and Boroughs may carry out work (as specified by Section 3 (3) (a) to (e) of the Act) that will or may cause flooding, increase water below the ground or coastal erosion (Section 39), in order to improve nature conservation, preserve cultural heritage or people's enjoyment of the environment/cultural heritage.
- Districts and Boroughs are classed as designating authorities under Schedule 1 of the Act. This allows them, where the conditions outlined in Schedule 1 are satisfied, to designate a structure or a natural or man-made feature of the environment where the authority thinks that the existence or location of the structure or feature affects a flood risk or a coastal erosion risk. The effect of designation is that a person may not alter, remove or replace a designated structure or feature without the consent of the responsible authority. Consent is provided through notices and Schedule 1 outlines enforcement powers and powers of entry that can be used to fulfil the requirements of Schedule 1.
- District and Borough Councils also have flood and drainage related responsibilities and powers specified in:
 - the Land Drainage Act 1991 (as amended by the Flood and Water Management Act);
 - the Public Health Act 1936;

-
- Environmental Protection Act 1990;
 - the Localism Act 2011.

5.1.6 Highways Agency

One recommendation of the Pitt Review was that the Highways Agency should consider the vulnerability of its network to flooding and prepare suitable measures to reduce the effects on road users.

The recommendations have been divided into the following project objectives.

- Identify locations on the network most sensitive to flooding.
- Produce maps showing the location of recent flood events.
- Compare flood events with the weather conditions to assess the risk of repeat events.
- Identify quick-win options for reducing the effects of flooding to road users.

The Highways Agency has been engaging with its service providers to identify the extent of existing flooding problems and the way in which they are currently being recorded.

Where motorways or trunk roads are identified as being at risk from flooding, contingency plans are being prepared to warn road users and, where necessary, divert them away from the problem. Where possible, weather data from the Met Office will be analysed and, if intense rainfall events are forecast in sensitive flood areas, suitable warnings will be posted using the variable message signs.

5.2 Flood Risk Management Partners

5.2.1 Town and Parish Councils

Town and Parish Councils have no formal duties in the management of flood risk. However, they have an important role to play in establishing local groups, developing community flood plans and raising awareness of flooding and flood response with their communities. Some Town and Parish Councils recruit Community Flood Wardens or people with similar interests, who help to support and prepare the community for flood events. They can also assist in identifying and reporting flood risk issues and vulnerable residents.

The county is covered by three Regional Flood and Coastal Committees: the English Severn and Wye, the Trent and the Thames.

5.2.2 Flood Action Groups

Flood action groups are community-based organisations that work in partnership with the Agencies and Authorities whose work involves flood risk to represent the views of local people. Through these 'grass-root' groups, communities are able to do the following.

- Address their concerns over malfunctioning assets/and other issues.
- Be in touch with what is intended for their community.

-
- Know procedures that are already in place regarding routine maintenance of flood risk management and drainage assets.
 - Have a voice as to the future flood risk management of their community through consultation.
 - Create awareness of flood risk to the wider community.
 - Prepare to reduce the impact on the community should a flood event occur.

5.2.3 Residents and Businesses

Responsibility for protecting property from flooding lies in the first instance with the property owner. While in some circumstances other organisations or property owners may be liable due to neglect of their own responsibilities, there will be many occasions when flooding occurs despite all parties meeting their responsibilities.

It is important that householders whose homes are at risk of flooding take the following steps to ensure the impact to their home is reduced.

- Check whether their property is at risk from flooding from all sources.
- Sign up to the Environment Agency Flood Alert and Warning system
- Ensure that preparations have been made in the event of a flood.
- Take measures to ensure that the impact of flooding to their property is reduced, either through permanent measures or temporary measures to their property structure. This may require planning permission to be sought.
- Where possible, take out flood insurance.

Information on areas at risk from flooding is provided on the Environment Agency's [website](#)⁹. Households in Flood Zones 2 and 3 can receive flood alerts from the Environment Agency when the risk of Main River or groundwater flooding is high. In some areas the Environment Agency also issue flood warnings, these are more detailed than flood alerts. Flood alert/warning information can also be found on the Environment Agency's [website](#)¹⁰ and via the Flood Alerts page on [Facebook](#)¹¹.

Information about surface water flood risk is also available on the Environment Agency's [website](#)¹². The risk of flooding from surface water is much harder to map and predict. Therefore, the Environment Agency does not currently issue specific area alerts/warnings for surface water flooding. The Met Office does provide severe weather warnings that predict

⁹ <http://apps.environment-agency.gov.uk/wiyby/37837.aspx>

¹⁰ <http://apps.environment-agency.gov.uk/flood/31618.aspx>

¹¹ https://apps.facebook.com/floodalerts/?fb_source=search&ref=ts

¹² http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

rainfall which may lead to surface water flooding, and these are available from their [website](#)¹³

The Environment Agency provides information on what to do to prepare a household for flooding emergencies. This includes how to make a flood plan which will help residents to decide what practical actions to take before and after a flood. For more information visit the Environment Agency's [website](#)¹⁴. Another useful document for householders to refer to is the [National Flood Forum's Blue Pages Directory](#)¹⁵ which provides information and advice on what products are available to help protect homes or businesses against flooding.

5.2.4 Riparian Landowners

Under common law, a riparian owner is someone who has a watercourse within or adjacent to any boundary of their property. Where a watercourse is sited between two or more property boundaries each owner may be equally responsible up to the centre line of the watercourse.

Although not defined as a flood risk management authority under the Act, Riparian owners retain their own duties and responsibilities for watercourses on or adjacent to their land as set out in the Land Drainage Act 1991. This includes the responsibility for the maintenance of any river, stream, ditch, drain, cut, dyke, sluice, culvert, sewer (excluding public sewers) or any other passage through which water flows.

Further information on the rights and responsibilities of riparian owners is also available on the Environment Agency's [website](#)¹⁶.

In some cases flood risk issues can impact on multiple landowners. In the County Council's experience of flood risk management, better results are usually achieved when adjoining landowners work together, rather than against one another, to resolve a flooding issue. Beyond this, there is the option to pursue civil proceedings. Agricultural Land Tribunals have an important role in settling disputes referred to them under the Land Drainage Act 1991 (sections 28-31), such as flooding caused by blocked drainage channels or inadequately drained land. Further details are included in Appendix E.

Network Rail is a significant landowner in Warwickshire with specific challenges where their infrastructure is affected by local flood risk. Due to the health and safety issues posed by live railways, enhanced collaboration is required to enable WCC as the LLFA to investigate flooding and manage local flood risk in the vicinity of Network Rail assets.

5.2.5 Developers

Developers are responsible for properly considering flood risk to ensure occupants of new developments are not put at risk and to ensure the risk of flooding is not increased

¹³ <http://www.metoffice.gov.uk/public/weather/warnings/#?tab=map&map=Warnings&zoom=5&lon=-3.50&lat=55.50&fcTime=1415318400>

¹⁴ <https://www.gov.uk/prepare-for-a-flood/find-out-if-youre-at-risk>

¹⁵ <http://www.bluepages.org.uk/>

¹⁶ <https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities>

elsewhere. Developers must undertake a robust assessment of the flood risk using the best available data in order to accurately characterise the risk and mitigate this risk where necessary. As the LLFA, WCC will work to address flood risk and development. WCC actively seeks new development to offer betterment with regards to flood risk to mitigate the risk they can pose (see also Section 3.5.3 above).

5.2.6 Regional Flood and Coastal Committees

Regional Flood and Coastal Committees (RFCCs) help to provide governance for the Environment Agency's Flood and Coastal Erosion Risk Management (FCERM) functions and cover all flood risks that are not the responsibility of the water companies.

RFCCs have three main purposes as follows.

- To ensure that there are coherent plans for identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines.
- To promote efficient, targeted and risk-based investment in flood and coastal erosion risk management that optimises value for money and benefits for local communities. This includes administration and allocation of Local Levy funding.
- To provide a link between the Environment Agency, LLFAs, other risk management authorities, and other relevant bodies to develop mutual understanding of flood and coastal erosion risks in its area.

5.2.7 National Flood Forum

The National Flood Forum (NFF) is a national charity dedicated to supporting and representing communities and individuals at risk of flooding. They do this by:

1. helping people to prepare for flooding in order to prevent it or mitigate its impacts;
2. helping people to recover their lives once they have been flooded; and
3. campaigning on behalf of flood risk communities and working with government and agencies to ensure that they develop a community perspective.

This is achieved by working to facilitate and support community flood groups. The National Flood Forum now has over 200 affiliated groups in England and Wales, including at least 14 within Warwickshire, and they aim to:

- help communities to recover from flooding;
- provide a telephone help line for all flood related enquiries, including insurance;
- provide information and guidance through their website and regular bulletin;
- run flood surgeries and exhibitions to help people with their problems and raise awareness;
- provide training for local authorities, agencies and the voluntary sector; and
- hold a 'Blue Pages directory' of products available on the market.

The NFF works to support the recovery of victims of flooding, to improve resilience of communities to future flood threat, speaks out to highlight the plight of flood victims and the

need for adequate flood prevention investment, and works with government, agencies and local authorities on issues such as flood risk insurance, property level protection and recovery to ensure that the needs of flood risk communities are represented

Working in Warwickshire, the NFF has helped to set up and support at least 14 flood action groups across the county, working at a grass roots level with communities to raise awareness about flood risk and allow them to build relationships with professionals who work in flood risk management. Encouragement is given to communities helping themselves and as a group they are able to be the 'eyes on the ground' (for example, reporting blockages in watercourses to landowners and Risk Management Authorities).

Small local flood risk management measures by local communities can help to reduce the impacts of flooding, measures such as: ensuring important documents (insurance etc.) are accessible and waterproof, cars are moved to higher ground or furniture raised etc. This will all help manage flood risk within Warwickshire in the future.

5.2.8 Canal and River Trust

The Canal and River Trust is a charitable trust that manages 2,000 miles of waterways in England and Wales. In Warwickshire they are responsible for management of six canals across the county; the Ashby Canal, Coventry Canal, North Stratford Canal, South Stratford Canal, Grand Union Canal and Oxford Canal. The Trust are therefore are key partners in managing water in Warwickshire and their activities have the potential to influence local flood risk in the vicinity of their waterways.

5.2.9 Severn Rivers Trust

The Severn Rivers Trust is an independent environmental charity established to secure the preservation, protection, development and improvement of the rivers, streams, watercourses and water bodies in the Severn catchment, and to advance the education of the public in the management of water and the wider environment.

In Warwickshire, the Severn Rivers Trust is assisting in the delivery of flood risk management options within the Warwickshire Avon catchment. Over the past three years, the Severn Rivers Trust have been involved in a number of projects that have made a positive impact on the Warwickshire Avon catchment, including a partnership project with the Woodland Trust and Environment Agency which involved planting over 3,500 trees on five farms to help maintain bank stability, reduce sedimentation and enrichment of the river, and to make a positive impact on peak flood flows. In addition to this, the Trust is directly involved in delivering catchment sensitive farming in the Leam catchment, and is one of a small group of key deliverers for rivers and streams in the Warwickshire Biodiversity Action Plan.

5.3 Partnerships

To enable effective management of local flood risk it is important that partnerships are established to allow those involved to work together. The main partnership forums in Warwickshire are:

- the annual Flood Summit with a broad range of partners including Parish, Town, District, Borough and County Councillors; and
- the quarterly county-wide Strategic Flood Forum which is discussed in more detail below.

The County Council are also involved in the national LLFA network where best practice is shared between flood risk management teams across the country. WCC also hold specific events in Warwickshire to bring together partners to discuss and share information on local flood risk management. The partnership framework within Warwickshire is set out below in Figure 5.1.

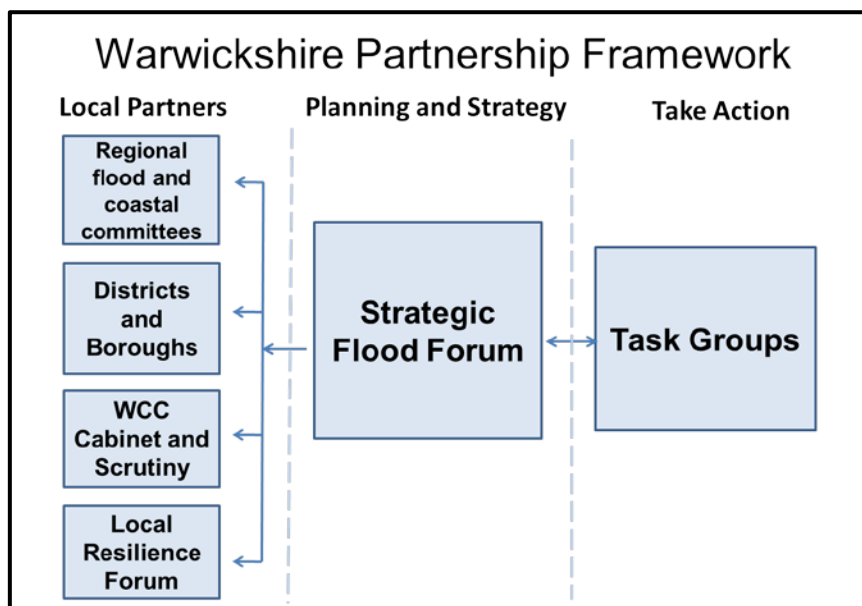


Figure 5.1: Warwickshire Flood Risk Partnership Framework

5.3.1 Warwickshire Strategic Flood Forum

After the flooding during the summer of 2007, a Strategic Flood Forum was set up within Warwickshire. The members of the forum are WCC, the five Local Authorities, the Environment Agency, Severn Trent Water, the Highways Agency, the National Farmers Union, Warwickshire Wildlife Trust, the Canal and Rivers Trust, the National Flood Forum, neighbouring LLFAs and planning groups.

The Warwickshire Strategic Flood Forum (WSFF) meets on a quarterly basis and has the following aims.

- Ensure effective collaboration between Agencies and Departments (including fire and rescue).
- Review progress of Agencies and Departments in respect to the recommendations of the Pitt Review.
- Look at maintenance and drainage infrastructure improvements in the medium to long term.

-
- Ensure local drainage forums meet regularly with appropriate representation and to progress key projects.
 - Prepare and update a list of key contact details between partners.
 - Review and propose improvements to communication systems during and after emergencies.
 - Help to review and influence organisational policies to ensure consistency.
 - Help to explore appropriate funding sources.

In addition to the main forum, tactical sub-groups focusing on north and south Warwickshire respectively have been formed to allow discussion and collaboration on more local operational issues.

5.4 Emergency Planning

The Coventry, Solihull & Warwickshire Resilience Team (CSWRT) undertake the emergency planning function on behalf of WCC and sit on the Local Resilience Forum. They operate a 24/7 Duty Officer System to ensure an effective response to any incident occurring across the sub-region.

The work of the CSWRT is dictated by the Civil Contingencies Act 2004. The Act places a number of duties on Local Authorities which CSWRT carries out.

- Assessing the risk of emergencies occurring.
- Putting emergency plans in place.
- Ensuring they have robust business continuity management arrangements.
- Sharing information with other local responders to enhance co-ordination.
- Co-operating with other local responders to enhance co-ordination and efficiency.
- Providing advice and assistance to businesses and voluntary organisations about business continuity.
- Making information available to the public about civil protection matters, and maintaining arrangements to warn, inform and advise the public in the event of an emergency, working closely with the Environment Agency.

Their main role in helping to manage flood risk in Warwickshire is to develop and maintain the Warwickshire Multi-Agency Flood Plan (MAFP). This plan aims to outline appropriate multi-agency arrangements to facilitate an effective, co-ordinated response to flooding in Warwickshire. This plan is not intended to replace existing internal plans or procedures held by partner agencies. Each organisation should ensure that they have the appropriate plans in place to remain operational, deliver business as usual activity and fulfil their responsibilities as part of the multi-agency response.

The CSW Resilience Team works in partnership with other authorities and the emergency services through the Local Resilience Forum (LRF).

5.4.1 Warwickshire Local Resilience Forum

The Warwickshire Local Resilience Forum (LRF) consists of all agencies involved with emergency response. There are a range of Category 1 and 2 agencies involved in the LRF including WCC, District and Borough Councils, Police, Fire and Ambulance services, Hospital trusts, the Environment Agency, Public Health England.

The LRF is a collaboration of all statutory responders, supporting joint working, which is a key part of the Civil Contingencies Act 2004. This act requires Category 1 and 2 agencies to prepare, respond and recover from different emergencies, including flooding.

6 Funding

This Strategy has set out a range of measures to help achieve its objectives. These include LLFA processes and systems, partnership working with others, working with communities to improve their resilience to flooding and promotion of capital local flood risk management schemes. Delivery of these measures depends on sufficient funding being available, either from ongoing revenue funding or project based support for capital schemes.

The funding available for any measure will be linked to the outcomes it will provide. Measures that deliver benefits beyond flood risk management, such as enhanced ecosystems, public amenity, economic growth or cultural heritage, are likely to attract funding from alternative sources beyond those typically used to support flood risk management. Funding is therefore based on the economic viability of schemes; not all potential flood alleviation schemes will be viable and not all will achieve funding. This highlights further the need to prioritise flooding locations and potential schemes, which is the subject of the county-wide Surface Water Management Plan (Appendix C).

The following sections describe the available sources of funding that could be used to support the measures outlined in this Strategy. The County Council and its partners have already achieved funding for flood alleviation schemes in Warwickshire from various sources, including Local Levy, Grant in Aid, developer contributions and landowner contributions.

6.1.1 FCERM GiA

Defra has the national policy responsibility for Flood and Coastal Erosion Risk Management (FCERM) and provides funding through Grant in Aid (GiA) to the Environment Agency, who then administer grants for capital projects; Local Authorities are one partner able to request such grants.

A new approach to funding capital maintenance and defence projects commenced in April 2012. It aimed to encourage communities to take more responsibility for the flood risk that they face, and aimed to deliver more benefit by encouraging total investment to increase beyond the levels that Defra alone can afford. The new approach sees funding levels for each scheme (provided by Defra through FCERM GiA) related directly to benefits, in terms of the number of households protected, the damages being prevented plus other scheme benefits such as environmental benefits, amenity improvement, agricultural productivity and benefits to business. Local contributions raised towards a project will help release the FCERM GiA.

Under this system some schemes will receive complete funding, if the benefits significantly outweigh the costs, and for others partial funding would be available.

Further details on how the Environment Agency allocates FCERM GiA funding are available from their [website](#)¹⁷.

¹⁷ <https://www.gov.uk/flood-and-coastal-defence-funding-submit-a-project>

6.1.2 Local Levy

Local Levy funding is an additional locally-raised source of income, gathered by way of a levy on Local Authorities and collected via the council tax. The levy is used to support (with the approval of the Regional Flood and Coastal Committee) flood risk management projects that are not considered to be national priorities and hence do not attract national funding through FCERM GiA. Alternatively, local levy funding can be applied to FCERM GiA projects, at the discretion of the Regional Flood and Coastal Committee, to meet the partnership funding requirements.

The county is covered by three Regional Flood and Coastal Committees; the English Severn and Wye, the Trent and the Thames.

6.1.3 Section 106

This is a contribution from developers, linked to specific developments and the infrastructure required to make them acceptable in planning terms. Its use can be very specific to the issue being addressed and is negotiated separately for each development. It can be used to pay for flood defences that specific developments need in order to be safe and so acceptable in planning terms.

One of the recommendations of 'Making Space for Water' was that local planning authorities should make more use of Section 106 agreements to ensure that there is a strong planning policy to manage flood risk. This means that any flood risk which is caused by, or increased by, new development should be resolved and funded by the developer.

6.1.4 Community Infrastructure Levy (CIL)

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. 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.

In Warwickshire, CIL will be administered by the District and Borough Councils. At present none of the authorities have implemented their CIL but they are in the process consulting on it. Use of the CIL for flood risk management will need to be balanced with the priorities for funding other infrastructure investment.

6.1.5 Warwickshire County Council Contributions

Warwickshire County Council (WCC) will continue to contribute funds towards flood risk management schemes and activities. Such funding will be most appropriate where schemes contribute benefits to a number of responsibilities of the County Council.

In addition, WCC has recently allocated an additional budget for flood alleviation, drainage and gully clearing. In the 2014/18 Budget Resolution approved by full Council in February 2014, an allocation of £1.1 million funding was made available until March 2018. This is intended to be used for CCTV survey of drains and gullies, match-funding towards flood

alleviation schemes, grants for small-scale flood alleviation works, additional resource for the LLFA team and emergency clearance of blockages on County Council owned assets. Parish and Town Councils and constituted groups can apply for funding in order to commission small-scale flood alleviation works to help themselves. It is likely that the grants will be assigned on a priority basis to those that are likely to offer the most benefits for the sum awarded. However, it may be possible for lower priority areas to 'move up the list' by bringing in their own external contributions

6.1.6 Local Authority Funding

The District and Borough Councils in Warwickshire may choose to contribute towards flood risk management schemes that benefit their area as part of a partnership with others. Some authorities have specific flood grant schemes as described below.

Stratford District Council Flood Grants

Stratford District Council makes £25,000 available on an annual basis for parishes in the district to apply for grants for minor works to provide community-wide flood risk management benefits. Other districts and boroughs in Warwickshire have shown an interest in this, and this idea could potentially be adopted more widely across the county.

Warwick District Council Flood Grants

Warwick District Council has a small (one-off) grant budget to assist local householders improve their flood protection. Grants of up to £500 per household can be awarded for eligible expenditure on any flood protection measures (flood gates and barriers, anti-flood air bricks, pumps, sand bags, etc) to domestic property located in Flood Zone 3 within Warwick District. This fund is limited and once all money has been spent it will cease to operate.

6.1.7 Local Enterprise Partnership - European Regional Development Fund

The Coventry and Warwickshire Local Enterprise Partnership receive funding from the European Regional Development Fund with the aim of encouraging economic growth. Theme 5: Promoting Climate Change Adaptation, Risk Prevention and Management has a specific focus on tackling flood risk in Coventry and Warwickshire. This theme has been allocated £1.7 million over a seven year period between 2017 and 2024. This funding is available for flood risk management measures in Warwickshire which enable economic development and deliver sustainable economic futures for communities at risk.

6.1.8 Water Framework Directive (WFD) Funding

There are some flood risk management activities which assist in meeting WFD targets. An example of this is weir removal, where the weir poses a blockage to fish migration. In such cases, it is possible to apply for 100% funding for weir removal and realise the associated flood risk management benefits. Weir removal should be preceded by an investigation into the potential impact on flood risk downstream and upstream of the weir (that there are no negative consequences) and a geomorphological study into the potential impact on sediment transport and equilibrium. It is important that the main driver for the project must be to meet the requirements of the WFD with the flood risk benefits being secondary.

6.1.9 Catchment Restoration Fund

This is an Environment Agency administered fund open to third sector organisations. The fund aims to restore more natural features in and around waters, and reduce the impact of small spread-out (diffuse) sources of pollution that arise from rural and urban land use.

6.1.10 European Funding

There are a range of other potential funding sources that are available from the European Union. These are usually reliant on the project meeting certain prescribed objectives and delivering specific benefits. More detail on the individual funding sources is given below.

INTERREG

These are a collection of funds aimed at promoting inter-region co-operation across the EU. These funds focus on delivering the Gothenburg and Lisbon agendas through high quality projects in innovation, the environment, accessibility and sustainable and competitive communities.

European Fisheries Fund

Primarily aimed at supporting the fishing industry, but will fund actions to protect and develop fish habitats under Axis 3 (funding for developments that will benefit groups, such as those working in the fishing industry).

7 Next Steps

7.1 Development of the Strategy

The Strategy is based on the best available data at the time of writing. As new information and data becomes available it will be updated as necessary to ensure it remains relevant. The Strategy will be supplemented by the preparation of the Surface Water Management Plan (SWMP) for Warwickshire and by the County Council. The Strategy and SWMP will be used to influence the preparation of Local plans, and the plans and strategies of other bodies.

7.2 Monitoring

WCC will monitor the progress of the Strategy against its aims and objectives on an annual basis. The annual Flood Summit will provide an opportunity for partners to input into this process. The County Council is also seeking to establish a Peer Review for the Strategy, and it has the capacity to review all strategies and plans regularly through, for example, Overview and Scrutiny panels.

7.3 Review of the Strategy

To ensure that the Strategy remains relevant and fit for purpose, it will remain a live document and an annual refresh will be provided. It is important that the information contained within it is the best available and it is in line with national policy on the management of local flood risk.

Triggers for review of the Strategy may include the following.

- Significant flood events that alter our understanding of flood risk in Warwickshire.
- Significant policy changes that affect the role of Flood Risk Management Authorities.
- Publication of significant new flood risk information and mapping.

The Strategy will be reviewed after five years, or beforehand (such as if one of the above triggers takes place) at the discretion of the WCC Portfolio Holder for flooding.

Appendices

Appendix A - Glossary

AStGWF	Areas Susceptible to Groundwater Flooding
BGS	British Geological Survey
Catchment Flood Management Plan (CFMP)	A strategic planning tool through which the Environment Agency works with other key decision-makers within a river catchment to identify and agree policies for sustainable flood risk management.
Chance of flooding	The chance of flooding is used to describe the frequency of a flood event occurring in any given year, e.g. there is a 1 in 100 chance of flooding in this location in any given year. This can also be described as an annual probability, e.g. a 1% chance of flooding in any given year. The standard notation is 'a 0.5 per cent (1 in 200) or greater chance of happening each year'. The use of return periods should be avoided.
CIL	Community Infrastructure Levy
Climate Change	A long-term change in weather patterns over a period of time that ranges from decades to millions of years. It may be limited to a specific region, or may occur globally.
Communities and Local Government (CLG)	Communities and Local Government is the government department which sets policy on local government, housing, urban regeneration, planning and fire and rescue. They have responsibility for all race equality and community cohesion related issues in England and for building regulations, fire safety and some housing issues in England and Wales. The rest of their work applies only to England. They provide funding to and agree expenditure plans for Local Authorities.
Critical infrastructure	Infrastructure which is considered vital or indispensable to society, the economy, public health or the environment, and where the failure or destruction would have large impact. This would include emergency services such as hospitals, communications, electricity sub-stations, water treatment works, transport infrastructure and reservoirs.
CSW	Coventry, Solihull & Warwickshire
CSWRT	Coventry, Solihull & Warwickshire Resilience Team

**Department for Environment,
Food and Rural Affairs (Defra)**

The government department responsible for policy and regulations on environmental, food and rural issues. This includes all aspects of flood risk management.

DG5 Register

A Water and Sewerage Company (WaSC) held register of properties which have experienced sewer flooding (either internal or external flooding) due to hydraulic overload, or properties which are 'at risk' of sewer flooding more frequently than once in 20 years.

Environment Agency (EA)

Established by the Environment Act 1995, and is a Non-Departmental Public Body of Defra. The Environment Agency is the leading public body for protecting and improving the environment in England. It is responsible for taking a strategic overview of the management of all sources of flooding. This includes, setting the direction for managing the risks through strategic plans; providing evidence and advice to inform Government policy and support others; working collaboratively to support the development of risk management skills and capacity; and providing a framework to support local delivery. They also have operational responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.

**Environment Agency Flood
Zones**

Flood Zones produced by the Environment Agency which provide an indication of the probability of flooding (from rivers and the coast) within all areas of England and Wales.

Exceedance flows

Excess surface water flow that occurs when the capacity of the drainage system is exceeded.

**Flood and Coastal Erosion Risk
Management (FCERM) policy**

Sets out the principles that should guide decision making on the sustainable management of flood and coastal erosion risk in England.

**Flood and Coastal Erosion Risk
Management Grant in Aid
(FCERM GiA)**

Central government funding to Flood Risk Management Authorities in order to manage flood and coastal erosion risk. This funding is provided by Defra to the Environment Agency to invest in flood risk management schemes. Funding from the Environment Agency which can be provided to local authorities to invest in flood risk schemes is called Capital Grant. Capital Grant is approved through the Project Appraisal Review (PAR) process.

Flood Risk Assessment (FRA)	A study to assess the risk to an area or site from flooding, now and in the future. It should also assess the impact that any changes or developments on the site or area will have on flood risk to the site and elsewhere. It may also identify, particularly at more local levels, how to manage those changes to ensure that flood risk is not increased.
Flood Risk Management (FRM)	The activity of managing the frequency or consequences of flooding. This may occur through actions such as construction and maintenance of flood defences, emergency planning and responding to flood events and facilitation of post event recovery.
Flood Risk Management Plan	A plan for the management of a significant flood risk. The plan must include details of: <ul style="list-style-type: none"> a) objectives set by the person preparing the plan for the purpose of managing the flood risk, and b) the proposed measures for achieving those objectives (including measures required by any provision of an Act of subordinate legislation).
Flood Risk Regulations 2009	Legislation that replaced the Floods Directive in England and Wales.
Flood (Risk Management) Strategy	An Environment Agency study which provides a detailed assessment of flood risk (from rivers and the sea) in a location or for a whole catchment, and the preferred approach for long term management of these risks.
Flood risk map	A map showing in relation to each flood risk (a) the number of people living in the area who are likely to be affected in the event of flooding, (b) the type of economic activity likely to be affected in the event of flooding, (c) any industrial activities in the area that may increase the risk of pollution in the event of flooding, (d) any relevant protected areas that may be affected in the event of flooding, (e) any areas of water subject to specified measures or protection for the purpose of maintaining the water quality that may be affected in the event of flooding, and (f) any other effect on - (i) human health, (ii) economic activity, or (iii) the environment (including cultural heritage).

Flood Map for Surface Water (FMfSW)

The Flood Map for Surface Water shows areas where surface water would be expected to flow or pond, as a result of two different chances of rainfall event. The areas at risk of flooding are displayed in two bands showing a) surface water flooding and b) areas of deeper surface water flooding.

This map has now been superseded by the Updated Flood Map for Surface Water (uFMfSW).

Flood and Water Management Act 2010 (FWMA)

The Flood and Water Management Act (FWMA) 2010 came into effect in April 2010. The Act takes forward a number of recommendations from the Pitt Review into the 2007 floods and placed new responsibilities on the Environment Agency, local authorities and property developers (amongst others) to manage the risk of flooding.

Floods Directive

The EU Floods Directive came into force in November 2007 and is designed to help member states prevent and limit the impact of floods on people, property and the environment. It was transposed into English law in December 2009 by the Flood Risk Regulations.

Geomorphology

The science dealing with the form and surface configuration of the earth.

Habitats Regulations Assessment (HRA)

A Habitats Regulations Assessment is the assessment of the impacts of implementing a plan or policy on international protected sites for nature conservation. These sites are Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites (wetlands of international importance designated under the Ramsar Convention). The purpose of Habitats Regulations Assessment is to ensure that plans will not result in significant damage to protected wildlife sites.

Highways Agency

The national body responsible for managing, maintaining and improving England's motorways and trunk roads.

Hotspot

A hotspot is an area perceived and identified locally as being at greatest risk of surface water flooding.

Land Drainage Act 1991 (LDA)

The Land Drainage Act details the duties and powers to manage land drainage for a number of bodies and groups, including local authorities, the Environment Agency, Internal Drainage Boards and riparian owners.

Local Enterprise Partnership (LEP)	A body, designated by the Secretary of State for Environment Food and Rural Affairs, established for the purpose of creating or improving the conditions for economic growth in an area.
LLFA	Lead Local Flood Authority
LiDAR	Light Detection and Ranging - high accuracy, high resolution elevation data captured by airborne systems.
Local Plan	The plan for the future development of the local area, drawn up by the local planning authority in consultation with the community. In law, this is described as the development plan documents adopted under the Planning and Compulsory Purchase Act 2004. Current core strategies or other planning policies, which under the above regulations would be considered to be development plan documents, form part of the Local Plan. The term includes old policies which have been saved under the 2004 Act.
Local Planning Authority (LPA)	The local planning authority (LPA) is empowered by law to exercise planning functions, often the local borough or district council. National Parks and the Broads Authority are also considered to be local planning authorities. County councils are the authority for waste and minerals matters.
Local Resilience Forum (LRF)	LRFs are multi-agency forums, bringing together all organisations that have a duty to co-operate under the Civil Contingencies Act, and are those involved in responding to emergencies. They prepare emergency plans and co-ordinate the response to major emergencies including flooding.
Main River	Main Rivers are watercourses marked as such on a main river map. Generally main rivers are larger streams or rivers, but can be smaller watercourses. Main Rivers are determined by Defra in England, and the Environment Agency has legal responsibility for them.

Multi-Agency Flood Plan (MAFP)	<p>A plan developed by the Local Resilience Forum to outline appropriate multi-agency arrangements to facilitate an effective, coordinated response to flooding in Warwickshire. The plan is implemented by Category 1 and Category 2 responders.</p> <p>Category 1 and Category 2 responders are organisations defined in the Civil Contingencies Act 2004. Category 1 responders are organisations at the core of the response to most emergencies. Category 2 organisations are ‘co-operating bodies’ who are less likely to be involved in the heart of planning work, but will be heavily involved in incidents that affect their own sector.</p>
NFF	National Flood Forum
National Coastal and Erosion Risk Management Strategy for England (NCERMS) (2011)	<p>The national strategy aims to ensure that flood risk is managed in a co-ordinated way within catchments and that this balances the needs of communities, the economy and the environment. The strategy encourages more effective risk management through enabling people, communities, business, infrastructure operators and the public sector to work to together.</p>
National Planning Policy Framework (NPPF)	<p>The National Planning Policy Framework was published in March 2012. It sets out the government’s strategy for planning, aiming to make the planning system less complex and more accessible, to protect the environment and promote sustainable growth.</p>
Ofwat	<p>Office of Water Services: a government body set up in 1989 to be the economic regulator of the water and sewerage industry in England and Wales.</p>
Ordinary watercourse	<p>An ordinary watercourse is any river, stream, ditch, cut, sluice, dyke or non-public sewer which is not a Main River. The local authority or Internal Drainage Board has powers for such watercourses.</p>
Partner	<p>Defined as someone with responsibility for decisions or actions. Partners share joint responsibility for these decisions/actions.</p>
Pitt Review	<p>An independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England.</p>
Pluvial flooding	<p>‘Pluvial’ flooding (or surface water flooding) is caused by rainfall and occurs due to water ponding on or flowing over the ground surface before it reaches a drain or watercourse.</p>

Preliminary Flood Risk Assessment (PFRA)

A PFRA is an assessment of floods that have taken place in the past and floods that could take place in the future. It considers flooding from surface water runoff, groundwater and ordinary watercourses.

Property Level Flood Resistance measures

Resistance measures are designed to keep flood water out of properties and businesses, and could include flood guards, flood doors, non-return valves and airbrick covers.

RBC

Rugby Borough Council

Regional Flood and Coastal Committee (RFCC)

The Regional Flood and Coastal Committee (RFCC) is a committee established by the Environment Agency under the Flood and Water Management Act 2010 that brings together members appointed by Lead Local Flood Authorities and independent members with relevant experience in flood risk management.

Riparian owners

A riparian owner is someone who owns land or property adjacent to a watercourse. A riparian owner has a duty to maintain the watercourse and allow flow to pass through freely.

Risk

In flood risk management, risk is defined as the probability of a flood occurring x consequence of that flood.

River Basin Management Plans (RBMP)

A management plan for all river basins required by the Water Framework Directive. These documents will establish a strategic plan for the long-term management of the River Basin District, set out objectives for waterbodies and, in broad terms, what measures are planned to meet these objectives, and act as the main reporting mechanism to the European Commission.

RMA

Risk management authority

SAB

Sustainable Drainage Systems (SuDS) Approval Body

Section 19 Investigation

An investigation of a flood event by the Lead Local Flood Authority under Section 19 of the Flood and Water Management Act 2010.

Section 106 Agreement

The section of the Town and Country Planning Act 1990 that provided for the creation of planning obligations, now replaced by Section 46 of the 2004 act. Section 106 agreements allow local authorities to ensure that developers provide financial contributions towards the infrastructure needed to support new developments.

Severn Trent Water (STW)

One of the ten water authorities in England formed under the Water Act 1973, to supply fresh water and treat sewage for around 8 million people living in the Midlands region of England and also certain regions of Wales.

Strategic Environmental Assessment (SEA)

Strategic Environmental Assessment (SEA) is a generic term used internationally to describe environmental assessment as applied to policies, plans and programmes. The European 'SEA Directive' (2001/42/EC) does not in fact use the term strategic environmental assessment. It requires a formal 'environmental assessment' of certain plans and programmes, including those in the field of planning and land use.

Strategic Flood Risk Assessment (SFRA)

A SFRA provides information on areas at risk from all sources of flooding. The SFRA should inform flood risk management decisions, and provides the basis from which to apply the Sequential Test and Exception Test (as defined in NPPF) in the development allocation and development control process.

Supplementary Planning Document (SPD)

A Supplementary Planning Document is a Local Development Document that may cover a range of issues, thematic or site specific, and provides further detail of policies and proposals in a 'parent' Development Plan Document.

Surface water flooding

In this context, surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, small water courses and ditches that occurs as a result of heavy rainfall.

SWMP

Surface Water Management Plan

Sustainable Drainage Systems (SuDS)

Sustainable drainage systems are a sequence of management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate and by attenuating and conveying surface water runoff slowly compared to conventional drainage. SuDS can operate at different levels; ideally in a hierarchy of source control, local control and regional control, and can be used in both rural and urban areas.

Updated Flood Map for Surface Water (uFMfSW)

The updated Flood Map for Surface Water was made public on the Environment Agency's website in December 2013. It improves upon the Flood Map for Surface Water (2010), and the Areas Susceptible to Surface Water Flooding maps (2009) through incorporating improvements in modelling techniques, understanding and data; combining appropriate local mapping from LLFAs with national mapping to provide an improved and consistent picture of surface water flood risk; and providing velocity and depth information for a range of flood probabilities.

UK

United Kingdom

Water and Sewerage Company (WaSC)

Set up under the Water Industry Act 1991. Ten regional water and sewerage operators provide sewerage services in England and Wales. They are South West Water, Wessex Water, Southern Water, Thames Water, Anglian Water, Severn Trent Water, Yorkshire Water, United Utilities, Northumbrian Water and Welsh Water.

Water Framework Directive (WFD)

A European Community Directive (2000/60/EC) of the European Parliament and Council designed to integrate the way water bodies are managed across Europe. It requires all inland and coastal waters to reach "good status" by 2015 through a catchment-based system of River Basin Management Plans, incorporating a programme of measures to improve the status of all natural water bodies.

WCC

Warwickshire County Council

UK

United Kingdom

WSFF

Warwickshire Strategic Flood Forum

Appendix B - Legislation and Policy

This appendix gives an overview of the legislation which is relevant to the Warwickshire Local Flood Risk Management Strategy. It does not cover every piece of legislation that is related to the management of local flood risk but is intended give an appreciation of those which are most relevant. The full legislation can be viewed at www.legislation.gov.uk.

Legislation

Flood Risk Regulations (2009)

The Flood Risk Regulations 2009 came in to force on 10th December 2009, and transposed the EU Floods Directive into UK law. The key provisions of the Regulations are the preparation of the following.

- Preliminary Flood Risk Assessments (PFRA) – this involves collecting information on past and future floods from surface water, groundwater and ordinary watercourses, and identifying where significant numbers of people are at risk (these are termed Indicative Flood Risk Areas).
- Flood Hazard and Flood Risk Maps – Where areas have been identified within the PFRA as being an indicative flood risk area hazard, and risk maps are required to be produced.
- Flood Risk Management Plans – The final stage is for the production of a Flood Risk Management Plan for the indicative Flood Risk Areas by 22nd December 2015.

The Flood Risk Regulations gave responsibility for the production of these to:

- The Environment Agency for Main Rivers and reservoirs; and
- Lead local flood authorities for all other forms of flooding (excluding sewer flooding which is not caused by rainfall).

The Land Drainage Act 1991

The Land Drainage Act details the duties and powers to manage land drainage for a number of bodies and groups, including local authorities, the Environment Agency, Internal Drainage Boards and riparian owners. The Flood and Water Management Act updates a number of elements of this legislation.

The key powers and duties provided to Warwickshire County Council by the Land Drainage Act are as follows.

- A general duty to the environment when exercising powers.
- Powers to maintain, improve and build new drainage related works.
- Consenting and enforcement powers for ordinary watercourses.

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- Powers to create byelaws.
 - General powers of entry onto land for water level management so that statutory authorities can exercise flood risk management for the common good.

Water Resources Act (1991)

The aim of the Water Resources Act is to prevent and minimise the pollution of water. Under the Act it is an offence to cause or knowingly permit any poisonous, noxious or polluting material, or any solid waste to enter any controlled water. The Environment Agency is responsible for policing this Act.

The definition of polluting material includes silt and soil from eroded areas. If silt or soil from eroded areas is found to be polluting a water body or watercourse, the Environment Agency has the power to prevent or clear up the pollution and recover the damages from the landowner or responsible person.

The Localism Act (2011)

The Localism Act introduces a number of proposals to provide new freedoms and flexibilities for local government. With regards to flood risk management the Localism Act requires Lead Local Flood Authorities (LLFAs) to establish processes to enable overview and scrutiny committees to review and scrutinise risk management authorities in their area. Risk management authorities have a duty to comply with a request made by an over-view and scrutiny committee for information or a response to a report in relation to its flood or coastal erosion risk management functions.

The Localism Act introduces the ‘duty to cooperate’, which requires all risk management authorities to work together. It is important these organisations work together across administrative boundaries when working in relation to flood and coastal erosion risk management.

Highways Act 1980

The Highways Act provides powers to Warwickshire County Council as the Highway Authority for the creation, improvement and maintenance of roads and for acquisition of land. Under the Act Warwickshire County Council, as the Highway Authority, are able to enter into Section 38 and Section 278 agreements with developers, allowing the adoption of new roads (Section 38) and the provision of off-site highway works in conjunction with a development (Section 278). The Act also provides legislation on navigable rivers and watercourses, with regards to construction bridges over and tunnels under water bodies and diverting watercourses. Section 100 of the Act gives Highways Authorities powers to undertake drainage works off the highway. Section 163 of the Act gives Highways Authorities powers of enforcement against water entering the highway from neighbouring land.

Civil Contingencies Act 2004

The Civil Contingencies Act details the framework for civil protection in the UK and sets out the actions required in a flood event. In order to provide protection in the event of a flood the Civil Contingencies Act is arranged in two sections: Part 1: local arrangements for civil protection; and Part 2: emergency powers.

Warwickshire County Council has a number of responsibilities under Part 1.

- Undertaking risk assessments.
- Developing Emergency Plans.
- Developing Business Community Plans.
- Arranging to make information available to the public about civil protection matters and maintain arrangements to warn, inform and advise the public in the event of an emergency.
- Share information with other local responders to enable greater co-ordination.
- Co-operate with other local responders to enhance greater co-ordination and efficiency.
- Provide advice and assistance to businesses and voluntary organisations about business continuity management.

Reservoirs Act 1975

The Reservoirs Act is applicable to all reservoirs classified as 'large raised reservoirs', meaning all those which hold a volume of water greater than 25,000 cubic meters above the natural level of any part of the surrounding ground level, and regulates the responsibility for their management and supervision.

The Reservoirs Act is amended by the Flood and Water Management Act, with the introduction of new arrangements for reservoir safety and the redefining of 'large raised reservoir' to include any reservoir with a volume of more than 10,000 cubic meters above the natural level of any part of the surrounding ground level. Under the changes provided by the Flood and Water Management Act all large raised reservoirs that are assessed as 'high risk' will be subject to full regulation and any large raised reservoirs not at 'high risk' will need to be registered. In addition, all incidents at reservoirs will need to be reported.

The Flood and Water Management Act defines a 'high risk' reservoir as any reservoir for which the Environment Agency considers that "*in the event of an uncontrolled release of water from the reservoir, human life could be endangered, and the reservoir does not satisfy the conditions (if any) specified in regulations made by the Minister*". These conditions may include conditions as to:

- The purpose for which the reservoir is used;
- The materials used to construct the reservoir;

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- The way in which the reservoir is constructed; and
 - The maintenance of the reservoir.

If a reservoir is subject to 'full regulation' a qualified (panel) civil engineer must be appointed to supervise the design and construction, the reservoir must be continually supervised once constructed, an inspection must be undertaken every ten years, and any measures recommended in the interests of safety must be supervised.

Habitats Directive (The Conservation of Habitats and Species Regulations) 2010

These regulations transpose the European Habitat Directive into English and Welsh law. The regulations focus on the importance of conserving natural habitats in order to help maintain and enhance biodiversity. The primary tool within the regulations for achieving this is the establishment of a network of protected areas and strict protection measures for particularly rare and threatened species.

The Strategic Environmental Assessment (SEA) Directive 2001

This legislation aims to increase the consideration of environmental issues during decision making related to strategic documents. It aims to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development.

It sets out the requirement for preparation of an environmental report in which the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and geographical scope of the plan or programme, are identified, described and evaluated.

Water Framework Directive 2000

Introduced in December 2000 and transposed into UK law in 2003, this piece of EC water legislation is designed to improve and integrate the way waterbodies are managed throughout Europe. European Member States must aim for inland and coastal waters to be at 'good' chemical and ecological status by 2015.

The Environment Agency is the coordinating authority for the Water Framework Directive in England. In order to address the requirements of the Directive, the Environment Agency has produced river basin management plans, which develop new ways of protecting and improving the water environment.

Plans and Policy

River Basin Management Plans (RBMP)

These plans have been prepared under the Water Framework Directive, which requires all countries throughout the European Union to manage the water environment to consistent standards. River Basin Management Plans assess the pressures facing the basin and set out potential actions to address them. The Plans are produced in a continuous process of planning and delivery. The Water Framework Directive introduces a formal series of six year cycles for River Basin Management Plans. The first cycle will end in 2015.

Warwickshire is primarily located in the Severn River Basin District and its' RBMP identifies the following key issues for management of the water environment:

- diffuse pollution from agriculture and other rural activities;
- point source pollution from water industry sewage works;
- physical modification of water bodies; and
- diffuse pollution from urban sources.

Because of these issue when the plan was written in 2009 only 29 per cent of surface waters are currently classified as good or better ecological status. By 2015 the plan predicted that 34 per cent of surface waters would be at good or better ecological status/potential and 65 per cent of groundwater bodies would be at good status by 2015. The Severn RBMP lists a number of actions to help address the above issues and achieve these improvements. The areas of Warwickshire covered by this RBMP are located within the Warwickshire Avon catchment.

Northern Warwickshire has areas that fall within the Humber River Basin District, these are located within the Tame, Anker and Mease sub-catchment of the RBMP. Although the River Basin Management Plan (RBMP) focusses mainly on pollution measures and water quality, due to the nature of the surface water flooding issues there are some crossovers. For example, there are cases of foul water entering the surface water network at times of flood and therefore having a negative impact on the water quality of the Tame, Anker and Mease sub-catchment.

Some key actions for this sub-catchment are:

- Improve sewage treatment works at a number of locations to reduce the levels of phosphate, for the River Trent designation.
- Target pollution prevention campaigns around industrial areas in the urban areas, particularly around Birmingham and the Black Country.

Part of Southern Warwickshire in Stratford-upon-Avon District has some small areas that are locate within the Thames River Basin District. These areas are located within the rural part of

the Cherwell catchment. The key interaction between this RBMP and local flood risk management is in promoting best practice for rural land management to control flood risk and pollution.

Catchment Flood Management Plans (CFMP)

CFMPs provide an overview of flood risk across a river catchment; they consider all types of flooding and consider the impacts of climate change. Key policies and actions at the catchment scale are provided in order to assist in the management of flood risk. CFMPs have been produced by the Environment Agency and are to be used as a tool that informs the management of flood risk on a river catchment basis.

The strategic policy for flood risk management in Warwickshire is outlined in three separate CFMPs, the Severn CFMP (2009), the River Thames CFMP (2009) and the River Trent CFMP (2010).

Each of the CFMPs aims to identify flood risk management policies for the catchments and sets out the preferred plan for sustainable flood risk management over the next 50 to 100 years. The Severn CFMP includes the catchment of the River Avon which dominates the southern part of the Warwickshire County Council area. The Trent CFMP covers the northern part of the Study Area including the River Tame. The Thames CFMP covers the southern and western extents of Stratford-on-Avon BC with the Sor Brook and Hanwell Brook draining to the Thames catchment.

The following policies for the approach to flood risk management are the same across the CFMPs and are as follows.

- Policy 1 – No active intervention (including Flood Warning and Maintenance). Continue to monitor and advise.
- Policy 2 – Reduce existing flood risk management actions (accepting that flood risk will increase over time).
- Policy 3 – Continue with existing or alternative actions to management flood risk at current level.
- Policy 4 – Take further action to sustain the current level of flood risk into the future (responding to the potential increases in risk from urban development, land use change and climate change).
- Policy 5 – Take further action to reduce flood risk.
- Policy 6 – Take action with others to store water or manage runoff in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment.

The policies for each of the CFMPs and sub regions are summarised in the table below.

CFMP Polices in Warwickshire

CFMP	Sub Region	Policy	LPA
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Severn	Middle Avon, Tributaries, Arrow & Alne, Redditch, Rugby & Teme.	Policy 3	Stratford-on-Avon DC & Rugby BC
	Upper Avon	Policy 6	Stratford-on-Avon DC & Rugby BC
	Coventry Cluster.	Policy 5	Warwick DC
Thames	Upper Thames	Policy 6	Stratford-on-Avon DC
Trent	Mid Staffordshire and Lower Tame	Policy 6	Stratford-on-Avon DC & North Warwickshire BC
	Upper Soar & Upper Anker	Policy 4	North Warwickshire BC & Nuneaton and Bedworth BC
	Birmingham and Black Country	Policy 5	North Warwickshire BC

National Planning Policy Framework (Department for Communities and Local Government, 2012)

The National Planning Policy Framework (NPPF) is the Government's strategy for planning in England. It states that "inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere".

The NPPF puts a strong emphasis on Local Plans and localism and therefore the Local Strategy presented here helps to underpin this central framework by providing a strong steer on flood risk management within a borough wide (i.e. local) setting.

Stratford-upon-Avon District Local Plan

The District Local Plan sets out the Council's policies and proposals for the development and use of land in Stratford District. It is used as a basis for considering all planning applications, including those for new housing, industrial and commercial development. The current Local Plan Review was adopted on 14 July 2006. The Local Plan Review expired on 14 July 2009. However, most of the policies and proposals it contained have been 'saved' and can

continue to be applied together with the provisions of the National Planning Policy Framework.

Stratford-upon-Avon District Core Strategy

Stratford-on-Avon District Council submitted their approved Core Strategy to the Secretary of State for independent examination in September 2014.

The Core Strategy sets out the vision, objectives and framework for managing development in the District up to 2031, contains policies on a wide range of specific subjects, and identifies a number of development site proposals.

Warwick District Local Plan (1996 – 2011)

The Local Plan is a land use plan which controls the location and nature of new development within the district. It contains policies and maps showing designations and allocations, and is primarily used to determine planning applications. It was adopted in September 2007. A new Local Plan is currently being prepared to replace this Local Plan which will guide the area's future development up to 2029.

Nuneaton and Bedworth Local Plan (2006)

The Local Plan set out land use policies and proposals for the Borough up to 2011, however it is yet to be replaced and most of the policies and proposals it contained have been 'saved' and can continue to be applied together with the provisions of the National Planning Policy Framework.

Nuneaton and Bedworth Borough Plan

The Borough Plan is currently being developed to replace the Local Plan and become the main source of planning policy for the Borough up to 2028. It is expected that the pre-submission version of the Borough Plan will be reported to Cabinet in January 2015 and will be followed by an eight week public consultation commencing in February 2015.

North Warwickshire Local Plan 2006

The North Warwickshire Local Plan was adopted on 4 July 2006. All but Core Policies 4, 7 and 9 were saved under Direction from the Secretary of State, and will be replaced as work progresses on the new Local Plan for North Warwickshire. The Core Strategy was adopted on 9th October 2014 and replaces some of the saved Policies of the Local Plan 2006.

Rugby Borough Local Plan 2006

The Local Plan set out land use policies and proposals for the Borough up to 2011, however it is yet to be replaced and most of the policies and proposals it contained have been 'saved' and can continue to be applied together with the provisions of the National Planning Policy Framework.

An update to the Local Plan is currently being developed. The next stage of consultation on the Preferred Options for the Local Plan is due in January 2015.

Warwickshire County Council Strategic Flood Risk Assessment for Local Development Framework – Level 1 (February 2008).

The SFRA is an evidence base used to inform the Spatial Planning process through assessing flood risk. The information collected as part of this process has been used to provide baseline information in the Strategy.

Stratford-on-Avon DC, Warwickshire CC, North Warwickshire BC & Rugby BC Level 1 Strategic Flood Risk Assessment (September 2013).

The SFRA is an evidence base used to inform the Spatial Planning process through assessing flood risk. The information collected as part of this process has been used to provide baseline information in the Strategy.

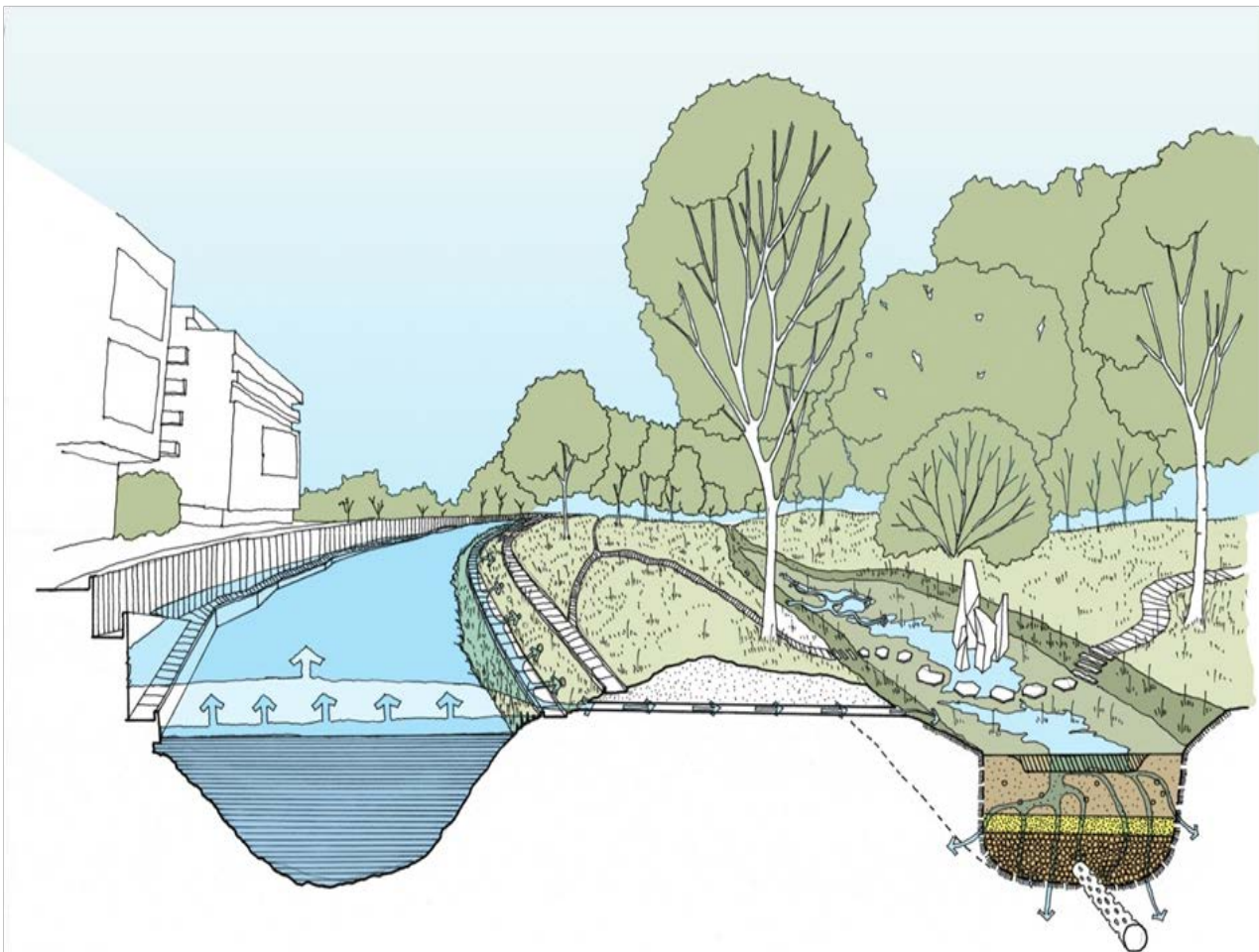
Warwickshire Preliminary Flood Risk Assessment (May 2011).

This is a high level document required under the EU Floods Directive which assesses the risk from local sources of flooding (surface water, groundwater and ordinary watercourses) within the County. The information collected as part of this process has been used to provide baseline information in the Strategy.

Draft Warwickshire Surface Water Management Plan (2014)

Warwickshire County Council (WCC) is currently developing a Surface Water Management Plan (SWMP) and Investment Strategy (see Appendix C). The SWMP is tasked with providing risk based evidence and a prioritisation process for future work, both of which will support the implementation of the Council's Local Flood Risk Management Strategy. Therefore, the SWMP will enable WCC to take an actively managed approach to flood risk reduction in future. The SWMP will develop a greater understanding of key surface water flooding locations, associated consequences and provide guidance and deliverables that will facilitate subsequent stages of the SWMP process.

Warwickshire County Council Surface Water Management Plan Methodology Report





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Table of Contents

1	Executive Summary	1
2	Introduction	4
3	Phase 1 – Preparation.....	10
4	Phase 2 – Risk Assessment	12
5	Phase 2 - Consultation and Data Collection	13
6	Phase 2 - SWMP Flood Risk Assessment.....	18
7	Summary.....	26
8	Next Steps for the SWMP	28
9	Conclusions.....	29

1 Executive Summary

- 1.1 The county of Warwickshire has experienced a number of significant flood events in recent times, often with complex flooding interactions from multiple sources. Notable events include January 1992, Easter 1998, August 1999, June 2005, summer 2007, December 2008 and November 2012. Among the various responses to these events, AECOM were appointed by Warwickshire County Council (WCC) to undertake a Surface Water Management Plan (SWMP) and Investment Strategy.
- 1.2 The SWMP is tasked with providing a prioritisation process for future flood risk management work. The SWMP will also form the risk assessment for the County Council's Local Flood Risk Management Strategy (the Strategy).
- 1.3 In the context of this study, surface water flood risk is defined as the following.
- Surface water runoff - as a result of high intensity rainfall when water is ponding or flowing over the ground surface before it enters the underground drainage network or watercourse, or cannot enter it because the network is full to capacity, thus causing flooding (known as pluvial flooding).
 - Flooding from groundwater - where groundwater is defined as all water which is below the surface of the ground and in direct contact with the ground or subsoil.
 - Sewer flooding – occurring when the volume of rainfall exceeds the capacity of the underground drainage system, resulting in flooding inside and outside of buildings. Sewer flooding in 'dry weather' conditions resulting from blockage, collapse or pumping station mechanical failure is not considered here and is a sole concern of the drainage undertaker (commonly Severn Trent Water in Warwickshire).
- 1.4 The SWMP objectives are to:
1. reduce risk to life from flooding;
 2. reduce risk of flooding to property (reduces residential and commercial damages);
 3. reduce risk of flooding to Critical Infrastructure (such as road and rail networks, hospitals and care homes);
 4. identify flood risk management constraints on development / regeneration; and
 5. identify opportunities for partnership projects.
- 1.5 Understanding the different sources of flooding and potential interactions and responsibilities between different organisations is important for the study to ensure that a comprehensive understanding of flood risk is obtained, and to identify the most appropriate measures for flood risk reduction. Flood history information was obtained from the following sources.
- Districts and Boroughs, and Parish and Town Councils and community groups;
 - Stakeholders and organisations:
 - Environment Agency;
 - Severn Trent Water;
 - Network Rail; and
 - Canal and River Trust.
- 1.6 To develop a comprehensive understanding of surface water flood risk in Warwickshire, it is important to capture where surface water flooding has occurred in the past, but also to identify where surface water flooding may be more likely to occur in the future.
- 1.7 Predictive flood risk information is from the Environment Agency's 'updated Flood Map for Surface Water' (uFMfSW).
- 1.8 To understand which areas are at greater risk, or where there are greater consequences, a series of thresholds have been required to refine the results. These rules will allow the ranking of sites which can be used to identify surface water flooding historic and future 'hotspot' locations and a priority list for further investigation.
- 1.9 Draft outputs are to be tested with a sensitivity analysis and have been discussed with project stakeholders. Feedback from these workshops will be combined with that from the public consultation before finalising the initial top sites.

Following which, opportunities for flood risk management partnership schemes with the Environment Agency and Severn Trent Water will be investigated before creating a final priority list of approximately ten sites. These may be taken forward for detailed analysis, including the development of options to reduce flood risk, an action plan for each site and a supporting Investment Strategy.

- 1.10 The SWMP project is still ongoing and this document presents the interim findings and methods used. This document has been issued as part of the public consultation on the Strategy in order to receive feedback prior to the completion of the SWMP, and the identification of locations to examine in further detail. Please send any comments or suggestions you may have to: Michael Green, Flood Risk Management, Warwickshire County Council, PO Box 43, Shire Hall, Warwick, CV34 4AS; or email flooding@warwickshire.gov.uk.

2 Introduction

Purpose of the Assessment

- 2.1 AECOM has been appointed by Warwickshire County Council (WCC) to undertake a Surface Water Management Plan (SWMP) and Investment Strategy for the county of Warwickshire.
- 2.2 WCC require a SWMP and Investment Strategy to provide an evidence base for their Local Flood Risk Management Strategy ('the Strategy') and to take a proactive approach to flood risk reduction through informed decision making.
- 2.3 This report has been produced to provide a summary of the methodology and approach of the technical work for the SWMP and forms the risk assessment part of the Strategy.

Scope of the Assessment

- 2.4 Working in partnership with WCC and key stakeholders, AECOM were required to deliver a SWMP based upon a risk based assessment process to prioritise flooding locations across Warwickshire and develop a greater understanding of key flooding hotspot areas, risks and associated consequences. The partnership will also provide guidance and deliverables that will facilitate subsequent stages of the Defra SWMP wheel (Figure 2.1). The SWMP needs to complement the Strategy and wider WCC Lead Local Flood Authority (LLFA) responsibilities by delivering a strong evidence base and by plotting a route to access potential funding sources for flood risk reduction measures.
- 2.5 Chapter 6 provides a definition of flood risk, the various sources of flooding that have been considered / discounted in this study, and outlines a summary of the techniques used to assess flood risk and associated consequences.

Study Area Introduction

- 2.6 The study area of the WCC SWMP covers the entire county of Warwickshire. It is bounded to the south by Oxfordshire and Gloucestershire, the west by Worcestershire and the Birmingham conurbation (West Midlands Metropolitan County), the north by Staffordshire and Derbyshire and to the east by Leicestershire and Northamptonshire. Warwickshire is considered an average sized county, spanning 1,975km², the shape of county means that it covers an elongated geographical area (nearly 100km), resulting in a wide range of extensive rural landscapes and smaller urban areas.
- 2.7 The majority of Warwickshire's population live in large towns and cities in the centre and north of the county. Market towns are prevalent in the north, such as Nuneaton, Bedworth and Rugby, whilst larger settlements of Warwick, Leamington, Stratford-upon-Avon and Kenilworth are located in the more central and western locations.
- 2.8 Warwickshire has a two-tier structure of local government and contains the following districts and boroughs:
 - Stratford on Avon District Council;
 - Warwick District Council;
 - Rugby Borough Council;
 - Nuneaton and Bedworth District Council; and
 - North Warwickshire District Council.



- 2.9 The City of Coventry is a separate unitary administration and so is therefore excluded from this study.
- 2.10 Figure 2.2 provides a map showing the context of the study area.



Figure 2.1 – Defra SWMP Wheel

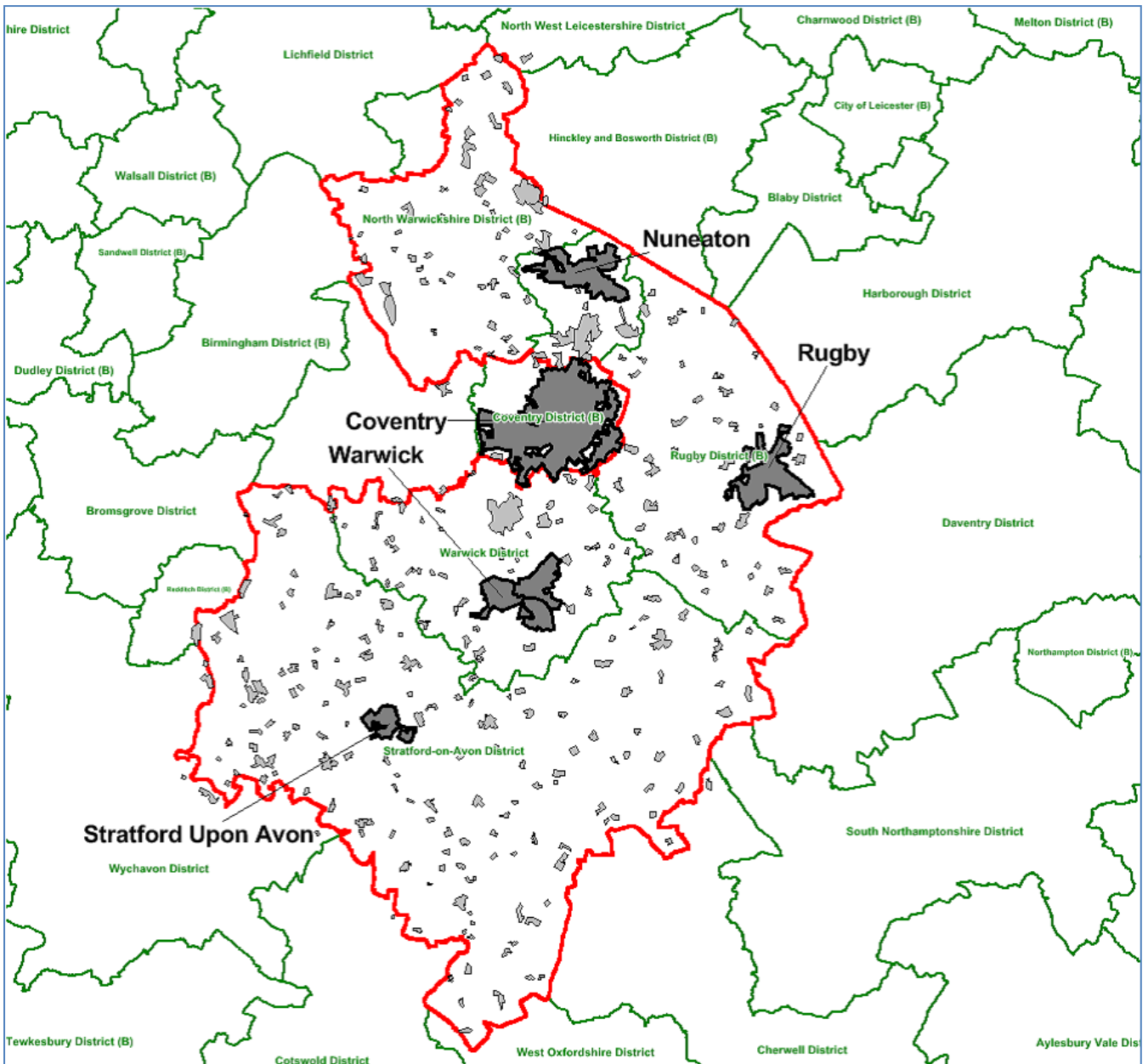


Figure 2.2 – Warwickshire County Council SWMP Study Area Map

SWMP Introduction

2.11 A SWMP outlines the preferred surface water management strategy in a given area. In this context, surface water flooding is flooding from sewers, drains, groundwater, and runoff from land, small water courses and ditches that occurs as a result of heavy rainfall. This SWMP study has been undertaken in consultation with key local partners and stakeholders who are responsible for flood risk management and drainage in the county, including Severn Trent Water, the Environment Agency and WCC Highways. The partners have been consulted and engaged to develop an understanding of the locations, causes and effects of surface water flooding, and to develop potential solutions to mitigate the surface water risk for the prioritised hotspots.



- 2.12 This report and the finalised results will provide the evidence base for action plans to manage surface water flood risk in Warwickshire, and will influence future capital investment, maintenance, public engagement and understanding, land use planning, emergency planning and future developments.

Warwickshire Flood Risk Context

- 2.13 The main urban areas are Stratford upon Avon, Warwick, Leamington Spa, Rugby, Nuneaton and Bedworth - centralising the population in the centre and north of the county, Figure 2.3. The majority of the rural areas comprise gentle rolling countryside with low lying river valleys, including the Rivers Avon, Stour, Anker and Tame. The majority of the county is located within the catchment of the River Avon, which drains into the River Severn. The Rivers Tame and Anker drain northern Warwickshire and are part of the wider River Trent catchment.
- 2.14 Fluvial (or “Main River”) flood risk in Warwickshire can be significant in both rural and urban locations, often with complex flood flow paths and interactions with surface water flooding. Surface water flooding issues will therefore be screened against Main River fluvial flooding to identify where potential partnership flood risk management schemes with the Environment Agency may exist. The WCC Level 1 Strategic Flood Risk Assessment (SFRA) 2008 and 2013 update study provides a comprehensive summary of the fluvial watercourses, and Figure 2.3 of this report shows the locations of the significant Main Rivers.
- 2.15 In addition to the gentle rolling valleys, Warwickshire also has undulating pockets of high ground and steep slopes (both in the northern and southern areas). Many of these areas have a higher risk of surface water flooding due to overland flows, which can result in significant disruption to many rural communities. Much of the county is underlain by impermeable clay. In urban areas, the complex networks of surface water sewer systems and high proportion of impermeable surfaces can cause significant surface water flood risk issues.
- 2.16 A review of previously published information shows that there have been several notable flood events in recent times. The most recent being in November 2012 where over 300 incidents were reported to WCC (with additional information gathered as part of the data collection exercise for this commission). Examples of significant flooded areas include Aston Cantlow, Middleton, Fenny Compton, Kenilworth, Gaydon, Nuneaton, Polesworth, Snitterfield, and Warwick (note that many other locations were affected by the November 2012 flood event and have been included in the data gathering exercise and subsequent analysis of this SWMP). Other notable flood events included the Easter 1998 and the summer of 2007 events. Table 2.1 provides a summary of these flood events.

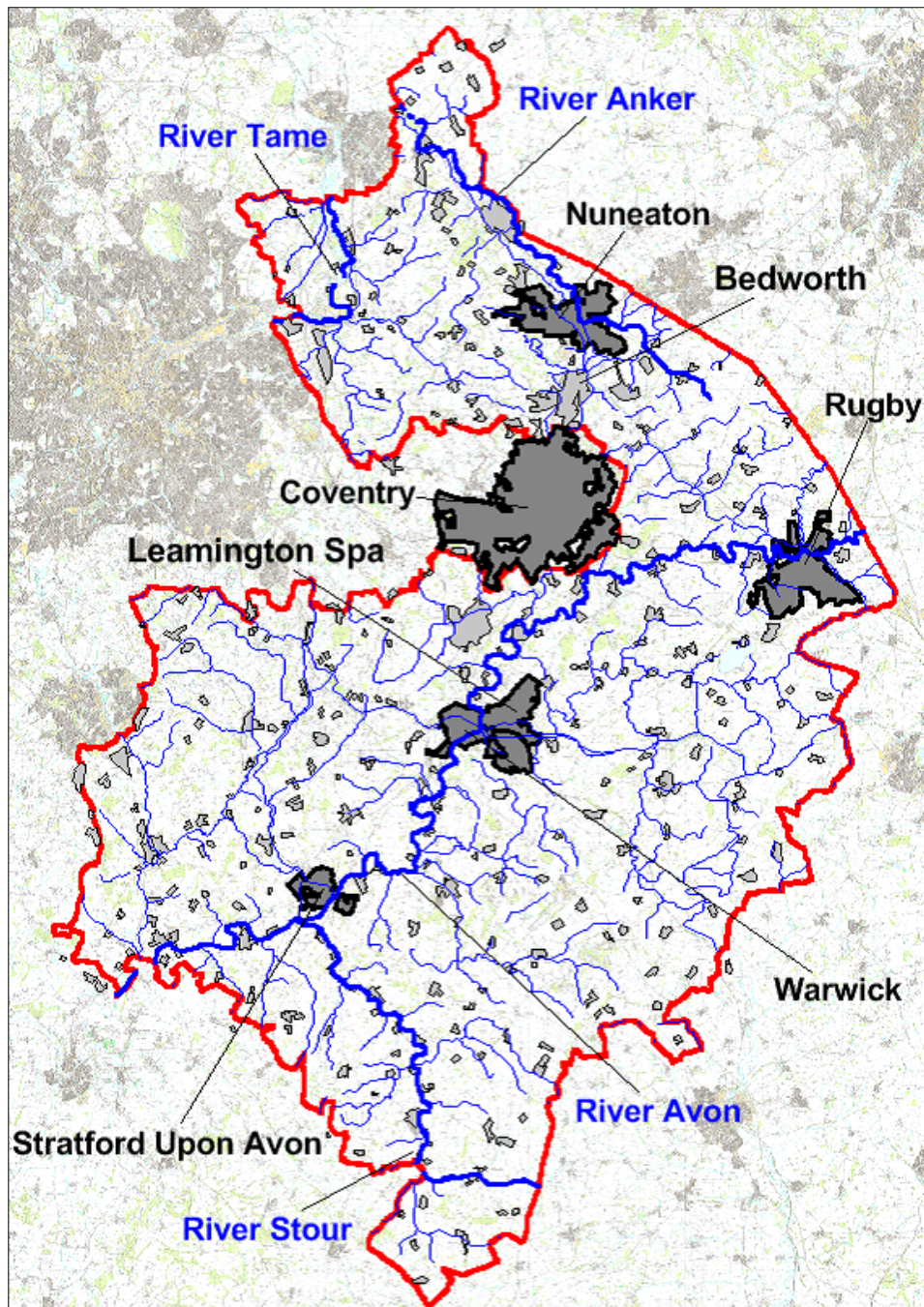


Figure 2.3 – Warwickshire Main Urban Areas and Rivers

Table 2.1 – Warwickshire Flood History Summary

Flood Event	Recorded Duration	Source of Flooding	Number of Properties Flooded
13th January 1992 WARWICK AND STRATFORD ON AVON DISTRICTS	< 1 day	Ordinary Watercourses Sewers Highways Drains Main Rivers	>35 internally (Snitterfield only)
Easter 1998 (9th April) SOUTHERN HALF OF COUNTY	2 days	Ordinary Watercourses Overland Flow Sewers <i>(surface water and combined)</i> Highways Drains Groundwater Main River	>480 internally >520 total
9th August 1999 WARWICK DISTRICT ONLY	<24 hours	Sewers <i>(surface water and combined)</i>	31 internally 35 total
June 2005 (24th - 28th) WARWICK DISTRICT ONLY	4 days	Sewers <i>(surface water and combined)</i> Main River	32 internally 46 total
Summer 2007 (June and July) COUNTY -WIDE	1 - 6 days	Ordinary Watercourses Overland Flow Sewers Highways Drains Main River	>1600 >1750 total
December 2008 CENTRAL WARWICKSHIRE	1 day	Ordinary Watercourses Main River Overland Flow Highways Drains	54 internally 55 total
21st – 25th November 2012	1 – 5 days	Ordinary Watercourses Overland Flow Sewers <i>(surface water and combined)</i> Highways Drains Groundwater Main River	Over 300 reported incidents

3 Phase 1 – Preparation

Introduction

3.1 This Chapter provides a summary of the approach taken for Phase 1 of the SWMP, the roles and responsibilities, and the development of the aims and objectives. The headings relate to the steps of the SWMP process, as presented in Figure 2.1.

Identify the need for a SWMP Study

3.2 WCC have recognised that the development of a SWMP study would provide a strong evidence base to inform the Strategy, and would facilitate a pro-active approach to flood risk management.

Establish Partnership

3.3 The Inception Meeting for this study identified that a key requirement of the SWMP was the need to establish strong project partnerships. Whilst a formal steering group was not established for the WCC SWMP, the principles were applied, and WCC undertook a series of meetings and workshops with partners and stakeholders and provided regular communications to report on progress (see Chapter 6).

3.4 Partners and stakeholders consulted included:

- Parish and Town Councils and community groups;
- District and Borough Councils;
- the Environment Agency;
- Severn Trent Water;
- Canal and River Trust;
- Network Rail; and
- Warwickshire Wildlife Trust.

Scope the SWMP Study

3.5 WCC took professional advice and reviewed best practice and SWMPs completed by other local authorities before scoping this SWMP.

3.6 WCC decided that a metric-based approach was required in order to provide a means for transparent decision making in the selection of sites for further investigation. This approach also allows an efficient method to update the SWMP study with new datasets in the future.

WCC SWMP Objectives

3.7 The WCC SWMP overall project objectives are to:

- develop a robust understanding of surface water flood risk across the county of Warwickshire, taking into account the importance of both urban and rural communities, the challenges of population and demographic change and increasing pressures on urban fringes;
- develop holistic and multifunctional recommendations for surface water management which improve emergency and land use planning, and enable better flood risk and drainage infrastructure investments;
- establish new and consolidate existing partnerships between key drainage stakeholders to facilitate a collaborative culture of data, skills, resource and learning sharing and exchange, and closer coordination to utilise cross boundary working opportunities;
- undertake engagement with stakeholders to raise awareness of surface water flooding, identify flood risks and assets, and agree mitigation measures and actions; and
- develop a robust Action Plan and guidance to deliver change where partners and stakeholders take ownership of their flood risk and commit to delivery and maintenance of the recommended measures and actions.

Guidance

3.8 The approach for the WCC SWMP has been guided by the Defra SWMP Technical Guidance. There are normally four phases to a SWMP process, comprising:

Phase 1. Preparation;

Phase 2. Risk Assessment;

Phase 3. Options; and

Phase 4. Implementation and Review.

Whilst the current study includes Phases 1 and 2, and initial elements of Phase 3, this report summarises the approach taken for the first two phases – SWMP preparation and risk assessment.

- 3.9 It is important to note that the Defra guidance recommends that the process is continual, with a review and update undertaken periodically, perhaps in tandem with updates to the Strategy, following a major flood event or in response to new major development planning. The approach and tools developed will allow efficient updates to be undertaken.

Deliverables

3.10 The final deliverables for the SWMP will comprise:

- the methodology report;
- SWMP results and hotspot / objective scoring analysis matrix; and
- a shortlist of priority flood risk hotspots
- a Strategic Flood Map to present the SWMP results.

3.11 Following the public consultation phase, refinements and changes may be required before finalising a priority list of ten sites to be taken forward to Phase 3 of the Defra SWMP wheel – ‘Options’.

4 Phase 2 – Risk Assessment

Introduction

- 4.1 The Chapter provides an overview of the data collation and review, the methodology and the results approach from Phase 2 of the Defra SWMP wheel - Risk Assessment.
- 4.2 Phase 2 comprises two distinct halves. The first is to identify the sources, mechanisms, frequency and extent and consequences of surface water flooding in Warwickshire. The second half of the process relates to the relative assessment of the flood risk problem locations, mapping and identifying the most significant areas, known as 'hotspots'. The second stage also includes capturing both predictive and historic flood risk information as well as the local knowledge and experience of partners. This provides a starting point for the identification of locations for more detailed assessment.

Phase 2 Overview

- 4.3 The Defra guidance recommends that Phase 2 of the SWMP includes data collection, assessment, mapping and communicating risk stages. Phase 1 identified that the predictive flood risk information for Warwickshire was of sufficient quality for the SWMP study. However, the historic data varied in detail, and a detailed data gathering exercise was therefore required. As a result, each historic dataset was assessed individually and through consultation with WCC, determined which datasets were to be carried forward to the matrix.
- 4.4 To undertake the assessment stage of Phase 2, a metric-based approach was developed and implemented which provides a clear audit trail of the decisions made, and produces outputs in line with the requirements of Phase 2 of the Defra SWMP wheel.

Phase 2 Key Stages

- 4.5 Phase 2 of the Defra SWMP wheel process is summarised below:
1. establish the approach for data collection and agree flood risk and receptor data sets for inclusion;
 2. undertake data collection and engagement with stakeholders;
 3. develop the matrix using the accrued GIS datasets;
 4. cross reference datasets and undertake technical analysis and sensitivity testing;
 5. present findings in terms of initial hotspot identification to project stakeholders, and assess the performance of the initial objective / metric weighting selection; and
 6. adjust weightings, re-run analysis and develop an agreed shortlist of sites to take forward to Phase 3.

5 Phase 2 - Consultation and Data Collection

Introduction

5.1 Credible data is needed to develop a comprehensive understanding of surface water flood risk in Warwickshire. The first stage of Phase 2 of the SWMP therefore includes the collation of such data. Information on the buildings or other assets (called “receptors”) affected by flooding is also important in order to allow the assessment of the consequences of flooding.

Existing Data Identified

5.2 At the start of the SWMP, WCC provided its understanding of surface water flooding, as gained from the following sources:

- ad-hoc historical records of flooding;
- the Preliminary Flood Risk Assessment (PFRA) and SFRAs; and
- Environment Agency national surface water flood mapping published in December 2013.

Existing Historical Records

5.3 The historic flood risk information was contained within relatively few datasets and limited geographical areas. The data tended to vary in detail, sometimes lacking spatial references and also suitable information about the nature of the flooding and receptors affected. WCC as LLFA have now developed standard ways of reporting and recording flood event data in the future.

Preliminary Flood Risk Assessment and Strategic Flood Risk Assessment

5.4 A PFRA was produced for Warwickshire and this identifies areas in which the risk of surface water and groundwater flooding is significant and warrants further examination. The PFRA was prepared by WCC in order to comply with the Flood Risk Regulations 2009 and in accordance with the Environment Agency’s Final PFRA Guidance published in December 2010. The report was published in March 2011.

Environment Agency National Mapping

- 5.5 The Environment Agency published their updated Flood Map for Surface Water (uFMfSW) in December 2013. This dataset is the third national surface water map that has been produced by the Environment Agency. It represents an improvement over previous surface water flood maps as a result of improved modelling and flood mapping techniques.
- 5.6 This predictive modelling dataset is now well developed and when supported by recorded flood history, provides a good basis for analysis and prioritisation of flood risk locations.

Data Collection and Review

- 5.7 A key objective of the study was to collate as much flooding information as possible, assess its quality and relevance, and combine it within an analysis that would result in the identification and ranking of flood risk locations. The use of a GIS system was also identified as a useful tool for the analysis and visualisation of the results, flooding and at-risk areas, which should assist with spatial planning. Therefore, relevant datasets were geo-referenced so that they could be added to the GIS assessment.
- 5.8 The existing records held by WCC were supplemented with additional information obtained by the following.
- A request for flood history information from:
 - Districts and Boroughs, and Parish and Town Councils and community groups;
 - project stakeholders (including Severn Trent Water, Network Rail, Canal and River Trust and Warwickshire Wildlife Trust);
 - Parish Engagement Workshops - A bespoke flood history questionnaire and map annotation exercise was undertaken as part of the Defra Pathfinder initiative¹. Comprising of workshops across the county, Parish and Town Council and community group members and key stakeholders were encouraged to identify areas of known flood risk and provide supporting information. To capture information from Parish and Town Councils

¹ Launched by Defra in 2012, 13 pilot projects across England were selected to develop innovative projects and flood action groups that will better protect homes and businesses from flooding.

not attending the Pathfinder workshops, the flood history questionnaire was also issued directly to representatives as a follow up exercise.

- 5.9 Following the initial data gathering exercise and engagement workshops, a gap analysis was undertaken and WCC provided the stakeholders a further opportunity for flood history data to be provided before the technical analysis stage commenced.
- 5.10 Project data was assessed against the data quality scoring system referred to in the Defra SWMP Technical Guidance Document (2010). Additional weightings of data importance were then established through sensitivity testing and stakeholder engagement workshops and incorporated into the project data matrix outlined in Chapter 7.

Flood Risk Datasets

Historic Flood Risk Datasets

- 5.11 The historic datasets that were used in the technical analysis are presented in Table 5.1 below, with a detailed data document register provided in Annex A.
- 5.12 Additional flood history information has been obtained from project stakeholders the Environment Agency (fluvial / Main River flooding) and Severn Trent Water (sewer flooding) that will be used to assess flood risk responsibility overlaps and potential flood risk management partnership schemes.

Table 5.1 – Key Historic Data

Stakeholder / Data Source	Data	Notes
Defra-funded Community Flood Resilience Pathfinder Workshops	<ul style="list-style-type: none"> Historic flood incidents recorded by Parish and Town Council and community group representatives and local stakeholders 	Data captured: Incident date(s), flooding location, source, flow route, depth, hazard, consequences (including property count)
WCC	<ul style="list-style-type: none"> Ongoing flood incident investigations Preliminary Flood Risk Assessment flood history data 2012 flood incident register Level 1 SFRA studies (2008 and 2013 update) Highways flood incidents 	
District and Borough Flood Records	<ul style="list-style-type: none"> Historic flood incidents 	A range of flood history datasets, with varying content and quality
Network Rail Flood History	<ul style="list-style-type: none"> Historic surface water flood incidents that affected Network Rail assets and caused disruption 	
Canal and River Trust	<ul style="list-style-type: none"> Historic surface water flood incidents affecting the canal network 	

Predictive Flood Risk Datasets

- 5.13 The predictive flood risk information used was the Environment Agency uFMfSW dataset. The 1 in 100 year flood results have been used to assess predicted surface water flooding extent, depth and hazard.
- 5.14 In addition, the Environment Agency second generation mapping (the Flood Map for Surface Water (FMfSW)) has been used during the sensitivity testing of the analysis as an additional check stage.

National Receptor Dataset

- 5.15 The National Receptors Dataset (NRD) has been used as the primary receptor data. The NRD was used to extract the residential, non-residential and Critical Infrastructure categories, using the Multi Coloured Manual² (MCM) codes in the attribute data. Entries such as ponds, reservoirs, post boxes and parks were removed from the dataset as these cannot be categorised into any of the objectives. This follows the same approach detailed in Annex 6 of the PFRA.

Critical Infrastructure

- 5.16 Mapping of critical Infrastructure in Warwickshire was informed primarily by the NRD. Additional data was obtained from WCC and also Ordnance Survey (OS) Strategic Open Source data including Control of Major Accident Hazard (COMAH) sites, motorways, primary roads, A and B roads and railway lines. Network Rail were also consulted to understand the vulnerability of their local assets and known problem areas. Reference was also made to the Warwickshire PFRA 'critical services' (Annex 6 of the PFRA) to ensure consistency, given that the PFRA also informs the Strategy.
- 5.17 The critical infrastructure types were categorised based on the vulnerability to flood risk classifications in Table 2 of the National Planning Policy Framework (NPPF) Planning Practice Guidance Flood Risk and Coastal Change Table³. Table 5.2 details the categories used, the NPPF vulnerability classification, and additional considerations. Additional utility data was extracted out of the NRD and placed in the 'More' vulnerable category as the confidence with this dataset was low due to the large volume of data and its associated lack of detail which could skew results if placed into the 'Essential' banding.
- 5.18 Discussions were also held with the Coventry Solihull Warwickshire Resilience Team (CSWRT) to refine the approach to critical infrastructure and the various categories. The SWMP output will also be discussed with CSW Resilience as there are classified sites within Warwickshire that have not been able to be included within the analysis and mapped outputs.

² Flood and Coastal Erosion Risk Management: A Manual for Economic Appraisal (Multi-Coloured Manual), Flood Hazard Research Centre, 2013

³ National Planning Policy Framework, Communities and Local Government, March 2012

Table 5.2 – Critical Infrastructure

Critical Infrastructure Category	Critical Infrastructure Type	
Essential Infrastructure	Pump house Pumping Sewage pumping Sewage storage Sewage treatment Sludge storage	Road and rail Water regulating Valve house Water settling Water treatment
Highly Vulnerable	Ambulance station Fire station Police services Police station	General commercial Office COMAH sites
More Vulnerable	Education First school Further education Further education college High school Higher education Infant school Junior school Middle school Nursery Pre-school education	Primary school Private primary school School Secondary school Technical college University Hospital Medical research Children's nursery Medical education accident and emergency departments
Utilities	Chimney Cooling Electricity generating Electricity sub station Gas monitoring Gas regulating Radar Radio communications	Telecommunications Telephone exchange Telephone relaying Television communications Ventilating Water distribution Windmill

Growth and Regeneration Area Datasets

5.19 Growth And Regeneration Area (GARA) datasets comprised the sources listed in Table 5.3. During the data gathering exercise it was noted that the various Districts and Boroughs were at different stages of their housing and employment allocation requirements for their Core Strategies, and that the terminology for considered and allocation areas varied. A

comprehensive approach was therefore adopted for the SWMP, capturing both allocated sites and those still under consideration and combined into a single receptor dataset.

Table 5.3 – Growth and Regeneration Area Component Datasets

Growth and Regeneration Area Component Datasets	
Housing	Employment
Strategic Housing Land Availability Assessment (SHLAA) sites	Local Enterprise Partnership (LEP) sites
Allocated Housing Sites	Employment Land Review (ELR) sites
Reasonable Alternative Housing Sites	Strategic Employment Sites
	Allocated Employment Sites
	Alternative Employment Sites

6 Phase 2 - SWMP Flood Risk Assessment

Introduction

6.1 This Chapter outlines the approach to the risk assessment and describes the datasets that were used.

Definition of Flood Risk

6.2 Flood risk is defined in the FWMA (Chapter 3, subsection 1) as “a risk in respect of an occurrence assessed and expressed (as for insurance and scientific purposes) as a combination of the probability of the occurrence with its potential consequence”.

Flood Risk = (the probability of a flood) x (scale of the consequences)

6.3 The effects of flooding can range from environmental damage and pollution, disruption to people's lives (such as travel delays), damage to property (such as business premises and homes), and the risk of injury or death. There are a number of factors that can affect the scale and severity of these consequences which include:

- the source and type of flooding;
- the depth and velocity of flood water;
- the duration and rate of onset of flooding;
- the presence or absence of debris in the flood water;
- the degree to which people and/or assets are exposed to the flood water;
- the level and amount of warning people receive;
- behaviour of people during a flood event; and
- the extent and vulnerability of the people and properties affected.

6.4 The SWMP study had quantified and assessed relevant consequence factors to identify those areas that should be prioritised for further assessment. Important consequences are the depth of flooding (used to understand where flooding may enter a property, and to understand the risk to life), velocity of flooding (used to understand risk to life), extent of flooding (used to understand locations where communities may be cut off and isolated).

Historic Flooding Information

6.5 Historic flooding information is being used to prioritise historic flooding locations and identify historic flooding 'hotspots'.

6.6 Historic flooding hotspot thresholds are as follows.

1. Flooding that poses a threat to the safety of the public or may directly result in serious injury or death.
2. Five or more residential properties internally flooded.
3. One or more commercial property internally flooded.
4. One or more piece of critical infrastructure affected that impacts on the wider area.
5. Flooding that places vulnerable individuals or vulnerable communities at risk e.g. hospitals, care and nursing homes, schools, secure units, etc.
6. Additionally, where one or more residential property has flooded internally from the same source on five or more occasions within the last five years.

Predictive Flooding Information - Environment Agency Surface Water Flood Maps

6.7 In the context of this study, surface water flood risk is defined as follows.

- Surface water runoff - as a result of high intensity rainfall when water is ponding or flowing over the ground surface before it enters the underground drainage network or watercourse, or cannot enter it because the network is full to capacity, thus causing flooding (known as pluvial flooding).

- Flooding from groundwater where groundwater is defined as all water which is below the surface of the ground and in direct contact with the ground or subsoil.
- Sewer flooding – occurring when the volume of rainfall exceeds the capacity of the underground drainage system, resulting in flooding inside and outside of buildings. Sewer flooding in 'dry weather' conditions resulting from blockage, collapse or pumping station mechanical failure is not considered here and is a sole concern of the drainage undertaker (commonly Severn Trent Water in Warwickshire).

6.8 The Environment Agency uFMfSW has been used. Technical details of the uFMfSW and how the maps were produced can be found in the Environment Agency's "What is the updated Flood Map for Surface Water"⁴ document. In the context of this SWMP, the 'Medium Risk Probability' data has been used to provide a balanced risk / consequence approach.

Table 6.1 – Surface Water Flood Risk Probability

Surface Water Flood Risk Probability	Rainfall Event	Probability
Very Low	< 1 in 1000 Year	< 0.1%
Low	1 in 1000 to 1 in 100	0.1% to 1%
Medium	1 in 100 to 1 in 30	1% to 3.33%
High	>1 in 30 year	> 3.33%

6.9 The uFMfSW also provides outputs that detail the predicted surface water flooding depth and velocity. This is important for this study to enable an assessment of flood hazard.

⁴ What is the updated Flood Map for Surface Water, 1.0, Environment Agency, November 2103

SWMP Flood Risk Assessment

6.10 This chapter describes the approach for the development and application of “metrics” used to quantify surface water flood risk in Warwickshire. Phase 2 of the Defra SWMP process requires the study to rank areas at risk of surface water flooding. The locations at most risk are termed “hotspots” and are potential locations for further detailed assessments, eventually leading to the possible introduction of measures to reduce flood risk. A summary of the process is outlined below in Figure 6.1.

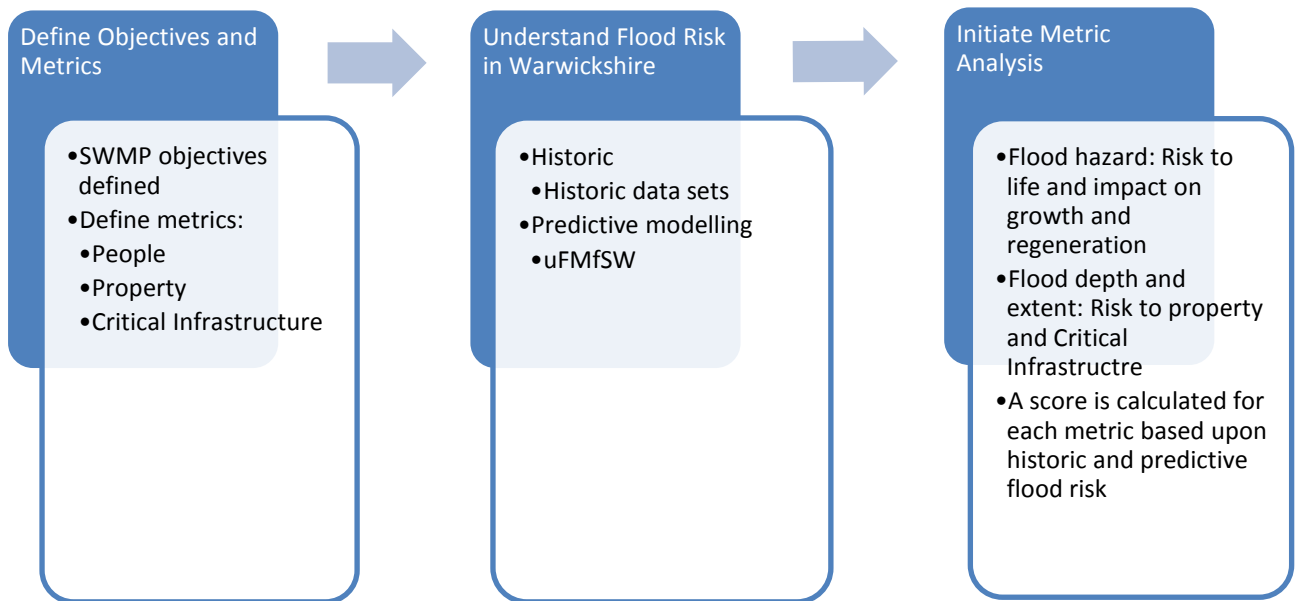


Figure 6.1 Flooding hotspot identification process

Surface Water Flooding historic “Hotspot” (High Priority Site) Identification

6.11 Through careful consideration and consultation with fellow LLFAs, WCC have developed the following thresholds for prioritisation of historic flooding events. These thresholds follow closely the areas of locally significant flood risk outlined in the WCC Preliminary Flood Risk Assessment (PFRA) of 2011.

1. Flooding that poses a threat to the safety of the public or may directly result in serious injury or death.
2. Five or more residential properties internally flooded.
3. One or more commercial property internally flooded.
4. One or more piece of critical infrastructure affected that impacts on the wider area.
5. Flooding that places vulnerable individuals or vulnerable communities at risk e.g. hospitals, care and nursing homes, schools, secure units, etc.
6. Additionally, where one or more residential property has flooded internally from the same source on five or more occasions within the last five years.

Surface Water Flooding potential future “Hotspot” (High Priority Site) Identification

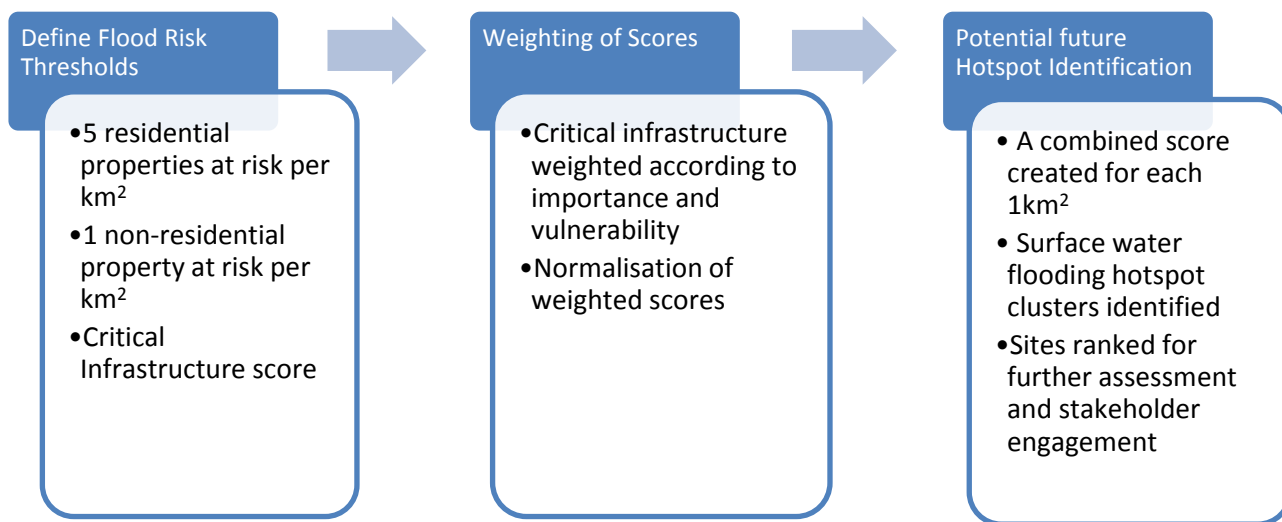


Figure 6.2 – Surface Water Flooding Potential Future Hotspot Identification Process

Metrics

6.12 To quantify the surface water flood risk and report against the “technical objectives”, a series of flood risk metrics have been developed relating to:

- people;
- properties (residential and non-residential); and
- critical infrastructure.

1km² Grid Based Assessment

6.13 The 1km² grid approach has been developed for the prioritisation of potential future flooding locations to allow risks to individual receptors to be aggregated and ranked. The grid has been orientated based upon the OS National Grid Reference (OS NGR) system. The result has identified risk squares termed hotspots that allow a quick and consistent assessment of risk. This is comparable with the approach adopted by the Environment Agency during the development of the “Flood Risk Areas” in the PFRA.

6.14 Output was exported to a “project matrix” for scoring, weighting and ranking (see below).

The Matrix

6.15 For the potential future flooding hotspots, a matrix has been developed in Excel which cross-references the predictive flood risk information with the receptor information. A series of rules have been developed in partnership with WCC to enable a flood risk / consequence score to be developed for each metric, which when combined and weighted, creates an overall risk-consequence score per 1km² grid cell, which can be ranked to highlight the top priority sites. The rules used within the matrix spreadsheet and individual scoring and weighting approaches have been trialled with WCC during sensitivity testing, as well as additional testing with project partners at stakeholder workshops.

6.16 The approach to the scoring, weighting and thresholds are presented in the sections below.

Metrics Scoring, Weighting and Thresholds

6.17 The following sections give some detail on the analysis that is likely to be used to prioritise potential future flooding locations, although these are subject to review as a result of the present consultation and further consultations with partners.

- 6.18 It is important for the Warwickshire SWMP to assess hazard and risk to life in both urban and rural locations, given the large number of rural communities and the consequences of flooding in villages and the connecting roads.
- 6.19 Flood hazard will be assessed per 1km² grid cell and a score derived as follows.

Table 6.2 – Flood Hazard Scoring

Hazard Score	Score	Flooded Area (sq km)	Score
< 0.5	0	< 0.1	0
> 0.5	1	< 0.2	1
>0.75	2	< 0.3	2
> 1.25	3	< 0.4	3
>2	4	< 0.5	4
		> 0.5	5

- 6.20 Flood hazard metric scoring example:
- If a 1km² grid cell has less than 0.1km² affected by surface water flooding with a hazard rating of 0.5-0.75, then it would have a composite score of 1*1=1
 - If a 1km² grid cell has between 0.3 and 0.4km² affected and a hazard of 0.5-0.75 it would have a composite score of 4*1=4

6.21 These hazard scores have been produced to provide thematic maps provide a visual representation of risk to life from surface water flooding across Warwickshire.

Risk to Residential and Non-Residential Properties

- 6.22 The metric scoring flooding of properties within a 1km² grid has been informed by both the number of properties affected by flooding and the flood depth. Where properties are shown to be inside the 1 in 100 year uFmFSW flood extent, flood depths have been analysed. When these depths are above 150mm (the assumed threshold elevation of all properties above the surrounding land), a score will be given and this is explained in Table 6.3.
- 6.23 Discussions with WCC highlighted the importance of capturing the risk to non-residential properties in both urban and rural locations. A property count approach is proposed.

Table 6.3 – Flood Depth Scoring

Scoring for Properties	
Depth (metres)	Score
< 0.15	N/A
< 0.3	1
< 0.6	2
< 0.9	3
< 1.2	4
> 1.2	5

6.24 Flood depth in property metric scoring example:

- If a property is within the less than 0.3m depth flood zone it will receive a score of 1, a property within the greater than 1.2m depth flood zone will receive a score of 5. If these are the only two properties affected by flooding within the 1km² grid cell the total score will be 1+5 = 6.

6.25 As with flood hazard, these scores serve two purposes. Firstly they have been included in the matrix to be added to the overall score for each grid cell. Secondly, graphical outputs have been created to thematically map the flood depth composite score to provide a visual representation of the hazard from deeper flooding in property across Warwickshire.

Critical Infrastructure

6.26 Scoring the critical infrastructure metric has a number of components. Firstly, it is informed by the flood extent and flood depth (applying the same 150mm threshold as used for property). Secondly, the vulnerability of the various types of critical infrastructure element is considered (as detailed in Table 5.2). Both of these elements are combined to create a weighted score for each type of critical infrastructure.

6.27 Table 6.4 provides a summary of the scoring approach. It should be noted that the different types of critical infrastructure are considered to have varying levels of importance / criticality. As a result, scores for flooding of critical infrastructure varies.

Table 6.4 – Critical Infrastructure Scoring

Category	Unit	Score
Road and Rail	See Note*	1
Essential Critical Infrastructure	Per occurrence	2
Highly Vulnerable Critical Infrastructure	Per occurrence	1.5
More Vulnerable Critical Infrastructure	Per occurrence	0.6
Utility (More Vulnerable)	Per occurrence	0.1

*Note: Trigger level is 1m in length to ensure localised flood risk locations are identified.

6.28 Critical infrastructure metric scoring example: If a cell contains the following and they are all shown to be at risk of flooding:

- 1 Road;
- 1 Railway;
- 1 Essential Critical Infrastructure; and
- 2 More Vulnerable Critical Infrastructure.

The following score would be created: 1 + 1 + 2 + (2*0.6) = 5.2.

A critical infrastructure “trigger” score of 5 or greater is also employed (i.e. anything below 5 will be reassigned a zero value). This has been developed following iterative sensitivity testing process to not skew results. Therefore in the example above, the metric score (5.2) is larger than the required trigger score, and so the cell is included in the overall 1km² grid score.

The ‘essential’, ‘high’ and ‘more’ classifications were extracted from the NRD data and counted based upon the analysis above. In the example above and shown in Table 7.4, the cell has at least 1m of road and rail affected. This is to ensure that all sections of road and rail affected are included in the analysis. For example there may only be 1m of road affected but it could be 3m deep.

Normalisation of Scores and Weighting

6.29 Following the initial scoring process, all scores were normalised so that each metric will have value between zero and one, whereby zero represented the lowest overall score and one represented the highest score for that particular metric.

Weightings were then applied to each metric to create a total combined score, allowing direct adjustment of the perceived importance of one metric versus another.

Potential future flooding hotspot identification

6.30 The individual normalised scores for each metric were combined and weighted within the matrix to produce a composite score for each 1km² grid cell. When the approach has been finalised following public consultation, the matrix will rank the top surface water flood risk areas for the entire county, with outputs also represented as thematic maps.

Additional datasets will be assessed in combination with the outputs from the matrix such as risk to life (informed by flood hazard) and future growth and regeneration areas (informed by the GARA datasets). Whilst these will not be used in the scoring process, they have been used to compliment the surface water hotspot identification process.

Matrix Sensitivity Analysis

6.31 A number of sensitivity tests will be undertaken to fine tune the trigger levels, scoring and weighting and also to assess the effectiveness of the choice of a 1km² grid as the basis for the analysis.

6.32 The sensitivity tests consist of applying various values and re-running the analysis to re-assess the top ranked results, and observe and understand how and why the ranking changed, (potential future hotspots moving position within the top ranked sites and new sites entering the top ranked sites).

6.33 The approach taken is to sequentially assess the performance of the matrix and approach, and assess which sites are repeatedly found to be ranked in the top sites.

6.34 An additional sensitivity analysis will be undertaken on the spatial positioning for the 1km² grid. The datum will be shifted by 500m horizontally and vertically to provide two sensitivity scenarios, as it is recognised that a flood risk location could be located entirely within a 1km² grid cell or could be divided across a number of grid cells – depending upon the datum origin, as highlighted in Figure 6.3.

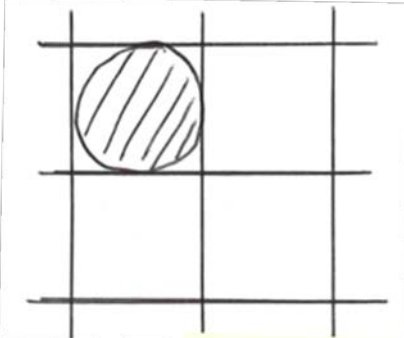
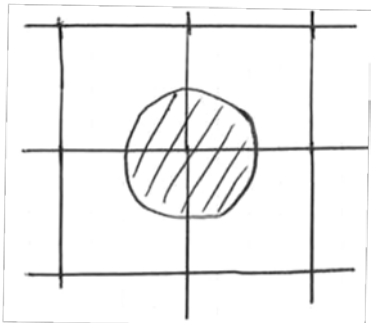
Grid Location Example	Flood Risk Location	Notes
1		<p>In this scenario, a theoretical flood risk-consequence issue is shown to be within a single 1km² grid cell.</p> <p>This could result in a high score for this cell.</p>
2		<p>In this scenario, a theoretical flood risk-consequence issue is shown to be divided across four 1km² grid cells.</p> <p>This could result in a low score in each cell that does not reach minimum trigger levels.</p>

Figure 6.3 – 1km² Grid Cell Datum Sensitivity Example

- 6.35 The quality of the previous FMfSW was generally regarded to be good by WCC and other RMAs in Warwickshire. To check that the updated version was suitable for use in this SWMP, a third sensitivity test will be undertaken to compare the latest Environment Agency surface water flood modelling output (uFMfSW) against the previous generation FMfSW dataset.

Stakeholder Workshop Sensitivity Analysis

- 6.36 Stakeholder workshops were held on the 27th November 2014 with representatives from the Districts and Boroughs, in addition to Severn Trent Water and the Environment Agency. The purpose of the workshops was to present a summary of the work undertaken to date, the assumptions made, and the initial results. It was agreed with WCC that feedback on the initial top 20 hotspots (a value chosen to make the process manageable) would be important to assess the performance of the initial scoring and weighting parameters.
- 6.37 During the meeting, the project team discussed how well the analysis was matching areas of known surface water flood risk, and how the ranking reflected the RMAs perception of which areas were at greater risk / had greater consequences. Live trialling of scoring and weighting combinations was undertaken by the team, and the results re-ranked to assess the impact of such changes.
- 6.38 It was observed during the workshop that greater weight needed to be given to the historic flooding locations to avoid skewing the results too far towards national scale modelling in the updated Flood Map for Surface Water.
- 6.39 It was therefore agreed that a more robust method for prioritising historic flooding locations should be utilised in the final analysis. The historic flooding hotspot threshold criteria are therefore given in Section 6.11 of this document.
- 6.40 WCC and AECOM will combine the stakeholder feedback and results of the live trials with the public consultation feedback to finalise the matrix approach and produce an improved list of the top hotspots for further investigation.

7 Summary

Introduction

7.1 This Chapter provides a summary of the results from the SWMP analysis to date and how they should be interpreted.

Ranked Hotspots

7.2 For the publication of this report, the results are presented as a summary for the whole of Warwickshire. Following the consultation on the draft Strategy and appropriate revisions to the methodology, scorings and weightings of the prioritisation of flooding locations, the revised SWMP report will contain a detailed section on the findings, presenting the top ranked sites, with a finalised priority list of 10 sites which may be taken forward for further consideration.

Strategic Flood Map

7.3 A range of SWMP Strategic Flood Maps will be produced to provide visual identification of the surface water flooding issues related to each of the SWMP objectives, in addition to an overall combined score and historic and potential future hotspot identification. This allows WCC and the users to readily identify the areas with the greatest risk and consequences to:

- people;
- property (residential & commercial); and
- critical infrastructure.

7.4 The maps are of particular importance as they allow the identification of hotspot clusters. This is vital for the potential future flooding locations, to ensure that the cells adjacent to those that rank highly are considered and the wider consequences taken into account if necessary.

7.5 Whilst the main objectives from the SWMP study are to identify the most significant surface water flooding hotspot areas, and to develop action plans and investment strategies, the SWMP Strategic Flood Maps is a useful tool for WCC and other RMAs in other ways as follows.

Local Flood Risk Management Strategy

7.6 The outputs from the SWMP process will be used as the risk assessment part of the Local Flood Risk Management Strategy for Warwickshire. Whilst the final stages of the SWMP will develop a priority list of key surface water flood risk hotspots, there will remain many locations across Warwickshire with significant risk and consequences that are outside of this list for further consideration. The SWMP therefore needs to remain a living Appendix of the Strategy and be updated with new datasets and flood history information.

Land Use Planning

7.7 The SWMP Strategic Flood Map will indicate areas where a more detailed study of surface water flooding may be required. Flooding hotspots may indicate areas with drainage problems known as Critical Drainage Areas (CDAs). WCC can therefore use the SWMP information to develop surface water control policies that both steer development away from at risk areas, and reduce risk through the requirement of SuDS and other sustainable designs measures.

Flood Risk Assessments

7.8 Whilst the SWMP Strategic Flood Maps are not suitable to inform site specific development related flood risk assessments, they will provide WCC and developers with a useful tool to assess if they need to seek further advice and technical support on surface water flooding when preparing a Flood Risk Assessment to support a planning application (where a proposed site is shown to be within an area subject to problematic surface water flooding).

Emergency Planning and Resilience

7.9 The SWMP Strategic Flood Map is a useful tool to inform emergency planning and resilience studies. The development of the SWMP was undertaken in parallel with the Community Flood Resilience Pathfinder project. A key message to communities in Warwickshire delivered as part of a Pathfinder workshops, was that flood preparedness and resilience is a crucial first step in coping with a flood event. The SWMP Strategic Flood Map will allow parishes and local flood action groups to further develop their understanding of local flood risk issues and provide information for community flood risk summary sheets and flood plans.

7.10 At a higher level, the SWMP Strategic Flood Maps can be used by emergency responders and resilience teams (such as CSW Resilience) to:

- raise general awareness of surface water flood risk;
- understand where suitable / unsuitable locations are for emergency control centres, evacuation centres and safe evacuation routes;
- understand the potential flood threat to critical infrastructure and to take action to identify the consequence of failure of key sites; and
- identify the locations of vulnerable sites and groups of vulnerable people such as schools and care homes.

8 Next Steps for the SWMP

Public Consultation and Finalisation of the Priority List.

8.1 This SWMP Methodology Report will be issued for public consultation in January 2015 as an Appendix of the Strategy. Following the consultation, feedback and comments will be reviewed and actioned where appropriate to refine the methodology and technical approach. After which, the ranking of sites will be undertaken and discussed with project partners. From this short list, a final Priority List will be developed which is likely to comprise 10 locations.

Action Plans and Investment Strategies

8.2 Action plans and investment strategies will be developed for the 10 priority locations, with a subsequent consultation period to follow. At this stage, the following broad themes for action plans and flood risk mitigation have been identified.

- Stakeholder engagement:
 - between RMAs, Districts and Boroughs and Parish and Town Councils community groups; and
 - public engagement.
- Increase understanding of surface water flood risk.
 - Improve the capture and documentation of existing flood risk history data; and
 - develop hydraulic models of critical sites;
- Identify potential surface water management measures including:
 - defining CDAs and associated policies;
 - developign SuDS policies;
 - localised SuDS schemes;
 - Water Sensitive Urban Design (WSUD) / Green Infrastructure solutions;
 - development control policies;
 - soft estate (grass verges etc) maintenance standards; and
 - partnership schemes with other RMAs (such as improvements and disconnection of surface water drainage from the combined sewer network).

Identification of Partnership Opportunities

8.3 During the development of the Priority List, engagement with other RMAs and stakeholders will take place to identify opportunities for potential partnership schemes and joint funding applications. A number of technical assessment approaches have been developed at this stage of the SWMP, and will be refined following the public consultation period.

Environment Agency

8.4 The top ranked surface water flooding hotspots will be cross referenced with Environment Agency supplied data including the Main River flood risk GIS data, information from the "Communities at Risk⁵" dataset and planned flood risk management schemes. Areas of potential fluvial / surface water interactions will be identified and discussed with the Environment Agency to understand their aspirations for these locations and investigate the potential for a combined scheme addressing flooding issues to a community in a holistic fashion.

Severn Trent Water

As for the Environment Agency, discussions are being held with Severn Trent Water to discuss the potential for joint schemes to address higher priority combined surface water flooding / sewer flooding hotspot locations. The final top ranked sites will be cross-referenced against Severn Trent Water flood history information and hydraulic model outputs and further discussions convened.

⁵ Midlands Communities at Risk 2013, Environment Agency Midlands, (April 2014)

9 Conclusions

- 9.1 The county of Warwickshire has experienced a number of significant flood events in recent time with complex interactions from multiple sources of flooding.
- 9.2 AECOM were appointed by WCC to undertake a SWMP to provide a prioritisation process for future flood risk management work. Supporting the implementation of the Council's Local Flood Risk Management Strategy, the SWMP will identify locations of significant flood risk and consequences within Warwickshire, develop a priority shortlist, engage with stakeholders and partners, and create an action plan for targeted investment.
- 9.3 The objectives of the SWMP are to:
1. reduce risk to life from flooding;
 2. reduce risk of flooding to property (reduces residential and commercial damages);
 3. reduce risk of flooding to Critical Infrastructure (such as road and rail networks, hospitals and care homes);
 4. identify flood risk management constraints on development / regeneration; and
 5. identify opportunities for partnership projects.
- 9.4 Understanding the different sources of flooding and potential interactions and responsibilities between different RMAs is important to the study to ensure that a comprehensive understanding of flood risk is obtained, and secondly to identify the most appropriate measures for flood risk reduction.
- 9.5 Flood history information was obtained from the following:
- Districts and Boroughs, and Parish and Town Councils and community groups;
 - Stakeholders and organisations:
 - Environment Agency;
 - Severn Trent Water;
 - Network Rail; and
 - Canal and River Trust.
- 9.6 The SWMP also needed to consider where surface water flooding may be more likely to occur in the future. Predictive flood risk information was obtained from the Environment Agency's 'updated Flood Map for Surface Water' (uFMfSW).
- 9.7 Identification and prioritisation of historic flooding hotspots is being undertaken using historic flooding information.
- 9.8 Prioritisation of potential future flooding requires the assessment of each flood risk location using numerical "metrics" assigned to each objective (e.g. the number of people per square km considered to be within flood risk areas). A summary of the metric analysis and flood risk location ranking process is as follows.
- Define project objectives and metrics.
 - Understand predictive flood risk in Warwickshire.
 - Cross reference flood risk information with receptors.
 - Create thresholds and weightings to allow greater importance to be placed on different metrics.
 - Identify potential future flood risk hotspots.
- 9.9 The approach and results were presented to stakeholders for comment and live sensitivity tests were undertaken on the weighting of metrics at partner engagement workshops. Feedback from these will be combined with that from the public consultation process, to refine the approach where needed before finalising a priority list of sites for further investigation and the development of action plans.

**Warwickshire Local Flood Risk Management Plan
Action Plan**

Aim	Timescale	Potential Funding Source	Partners
Objective 1 - Develop a better understanding of local flood risk in Warwickshire			
Further develop the Surface Water Management Plan for the county.	<ul style="list-style-type: none"> ■ Undertake further assessment of surface water flood risk in key risk hotspots with detailed hydraulic modelling where appropriate. 	December 2016	LAs, STW
Work with partners to investigate locally significant flooding incidents and identify sources, pathways and receptors of flooding.	<ul style="list-style-type: none"> ■ Undertake flood investigations. ■ Test and validate approach to prioritisation of flood investigations. ■ Test and review thresholds for when WCC will undertake Section 19 flood investigations. 	Ongoing	LAs, STW, EA
Further develop and continue to maintain a register of flood risk management assets with a record of the significant structures with respect to flood risk, together with details of ownership and state of repair and where appropriate the designation of such structures or features, which may affect flood risk.	<ul style="list-style-type: none"> ■ A record of each structure, together with details of ownership and state of repair and where appropriate the designation of such structures or features, which may affect flood risk. 	Ongoing	STW
Review the Preliminary Flood Risk Assessment as required by the EU Floods Directive and Flood Risk Regulations (2009).		June 2017	LAs, STW

Abbreviations: LA – Local Authority, EA – Environment Agency, SWT – Severn Trent Water, CWSRT – Coventry, Solihull and Warwickshire Resilience Team

**Warwickshire Local Flood Risk Management Plan
Action Plan**

Aim	Timescale	Potential Funding Source	Partners	
Objective 2 - Adopt an economically and environmentally sustainable approach to management of local flood risk in Warwickshire				
The actions of the emerging SWMP to be progressed and where suitable flood risk management schemes are identified funding to be sought.	<ul style="list-style-type: none"> ■ Develop a prioritised list of potential local flood risk management capital schemes. ■ Develop business cases for potential capital schemes. 	2017	FCERM GiA, Local Levy, LA & WCC Contributions, other specific funds.	Las, STW
To work with partners to encourage flood management activities by riparian landowners of ordinary watercourses and flood defence structures as well as limiting the development of constrictions on ordinary watercourses through consenting and, if necessary, enforcement.	<ul style="list-style-type: none"> ■ Produce a leaflet for landowners regarding their rights and responsibilities with respect to ditches, watercourses, culverts and hedges. ■ Consenting. ■ Enforcement. 	Ongoing	Riparian Owner Contributions	Riparian Owners, Las
To work with partners to encourage flood schemes by third parties, riparian landowners and stakeholders.	<ul style="list-style-type: none"> ■ Make use of County Council fund to provide partnership contributions to flood alleviation schemes. ■ Provide technical advice to third parties, riparian landowners and stakeholders. 	Ongoing	Riparian Owner Contributions FCERM GiA, Local Levy, LA & WCC Contributions, other specific funds.	EA, Las
To lead on the implementation of local flood risk management schemes and work with partners to best utilise funding obtained through a prioritised risk-based approach.	<ul style="list-style-type: none"> ■ Make use of funding from County Council to provide partnership contributions to flood alleviation schemes. 	Ongoing	FCERM GiA, Local Levy, LA Contributions, WCC Contributions.	Las, STW, EA

Abbreviations: LA – Local Authority, EA – Environment Agency, SWT – Severn Trent Water, CWSRT – Coventry, Solihull and Warwickshire Resilience Team

**Warwickshire Local Flood Risk Management Plan
Action Plan**

Aim	Timescale	Potential Funding Source	Partners
Objective 3 - Adopt a collaborative approach to local flood risk management			
To continue to develop the Warwickshire Strategic Flood Forum (WSFF) and relations with other partners.	<ul style="list-style-type: none"> ■ Develop tactical groups for north and south Warwickshire to allow greater focus on local issues. 	Ongoing	LAs, EA, STW
To share knowledge and training opportunities with partners.	<ul style="list-style-type: none"> ■ Continue to participate in national and regional LLFA best practice sharing groups. ■ Continue to work with partners in taking advantage of training opportunities, realising economies of scale. ■ Continue to offer training to partners where appropriate. 	Ongoing	LAs, EA
Continue to work with and support community flood action groups, Town and Parish Councils and other community groups.	<ul style="list-style-type: none"> ■ Attend flood action group meetings to support their work. ■ Provide technical advice and guidance to flood action groups. 	Ongoing	LAs, EA, Town and Parish Councils
Continue to engage local communities building on the progress made by the Community Flood Resilience Pathfinder Project.	<ul style="list-style-type: none"> ■ Promote the formation of new flood action groups where appropriate. 	Ongoing	LAs, Town and Parish Councils
To work with neighbouring Lead Local Flood Authorities to ensure a catchment-based approach to local flood risk management.	<ul style="list-style-type: none"> ■ Attend regional partnership meetings with other LLFAs 	Ongoing	Other LLFAs

Abbreviations: LA – Local Authority, EA – Environment Agency, SWT – Severn Trent Water, CWSRT – Coventry, Solihull and Warwickshire Resilience Team

**Warwickshire Local Flood Risk Management Plan
Action Plan**

Aim	Timescale	Potential Funding Source	Partners	
Objective 4 - Promote community preparedness and resilience to local flood risk				
To work with partners to reduce the impacts of flooding by enabling an efficient response to flooding incidents from partners and stakeholders.	<ul style="list-style-type: none"> ■ Engage on updates to the Warwickshire Multi-Agency Flood Plan. 	Ongoing		CSWRT
To work with partners to reduce the harmful consequences of local flooding to communities and human health through pro-active actions, community activities and education programmes that enhance preparedness and resilience to local flood risk, thereby promoting community cohesion and minimising community disruption.	<ul style="list-style-type: none"> ■ Community Engagement and Education Meetings 	Ongoing		LAs, CSWRT
Continue the work of the Warwickshire Flood Resilience Community Pathfinder project in supporting local groups to increase the resilience of their communities to flooding.	<ul style="list-style-type: none"> ■ Promote the recruitment of flood wardens where there are no existing local groups 	2016		LAs, Local Communities
Continue to improve communications and advice given during flooding events.	<ul style="list-style-type: none"> ■ Improve County Council flood call management procedures 	2016		CSWRT, LAs, EA
To work with partners to establish a co-ordinated approach to the provision of temporary flood risk management measures.				CSWRT, LAs

Abbreviations: LA – Local Authority, EA – Environment Agency, SWT – Severn Trent Water, CWSRT – Coventry, Solihull and Warwickshire Resilience Team

**Warwickshire Local Flood Risk Management Plan
Action Plan**

Aim	Timescale	Potential Funding Source	Partners	
Objective 5 - Enable planning decisions to take full account of local flood risk and seek to reduce local flood risk through development				
To work with partners to produce local policies and guidance and set standards to promote a positive impact on flood risk from new development, and to minimise any potential negative impact on flood risk from new development.		Ongoing		LAs
To maximise opportunities for contributions towards flood risk management from new development to address existing local flood risk.	<ul style="list-style-type: none"> ■ Explore the possibility for the use of Section 106 agreements and Community Infrastructure Levy with Local Planning Authorities. 	Ongoing		LAs
Develop byelaws where beneficial to control development	<ul style="list-style-type: none"> ■ Byelaw to limit development in the vicinity of ordinary watercourses. 	2016		LAs
Work with relevant partners to promote SuDS measures for new developments, the exact scope of which is dependent upon the outcome of Defra and CLG's current SuDS consultation.		2015?		LAs

Abbreviations: LA – Local Authority, EA – Environment Agency, SWT – Severn Trent Water, CWSRT – Coventry, Solihull and Warwickshire Resilience Team

Warwickshire County Council – Flood Investigation Policy

The Flood Risk and Water Management Team (FRM Team) at Warwickshire County Council (WCC) hold the role of Lead Local Flood Authority (LLFA) to oversee flooding within Warwickshire. This role was created in response to the 2007 floods and was one of a number of recommendations of The Pitt Review.

The Flood and Water Management Act 2010 (FWMA) is the key piece of legislation for local flood risk management in England and Wales. The Act updated existing legislation, implemented the recommendations presented in the Pitt Review, and outlined the role that Local Authorities have in managing flood risk in their respective regions. The County Council, as the LLFA for its area, has a duty to investigate flooding incidents that it becomes aware of, to the extent that it considers necessary or appropriate as stated in the FWMA.

Section 19 of the Flood and Water Management Act 2010 outlines that:

(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.

The need to investigate a particular flood is determined on a case-by-case basis considering a number of factors. Due to the size of Warwickshire and the limited resources that local authorities must work within, there is a need for prioritisation across the county to ensure that the best use is made of our available time and resources. Our approach to prioritisation is outlined in Box 1. A similar approach to this has been taken by our neighbouring authorities and others nationally.

Box 1 – Flood Investigation Prioritisation

Through careful consideration and consultation with fellow LLFAs, WCC have developed the following thresholds for prioritisation of flooding events and as such, the order in which we will investigate. These thresholds follow closely the areas of locally significant flood risk outlined in the WCC Preliminary Flood Risk Assessment (PFRA) of 2011, and these thresholds determine what will be termed flooding ‘hotspots’ in the SWMP (see Appendix C).

1. Flooding that poses a threat to the safety of the public or may directly result in serious injury or death.
2. Five or more residential properties internally flooded.
3. One or more commercial property internally flooded.
4. One or more piece of critical infrastructure affected that impacts on the wider area.
5. Flooding that places vulnerable individuals or vulnerable communities at risk e.g. hospitals, care and nursing homes, schools, secure units, etc.
6. Additionally, where one or more residential property has flooded internally from the same source on five or more occasions within the last five years.

The LLFA team may investigate flooding outside these categories, but only when all outstanding issues with a higher priority have been considered. These investigations will be prioritised based on the same six criteria listed above. Flooding on public land outside of the above categories will be addressed before flooding to residential gardens and on private land. Although inconvenient and possibly distressing to the individual, flooding to private land is fundamentally a land drainage issue involving adjacent landowners that will be dealt with by the LLFA team on an advice basis only. Landowners may contact the Agricultural Land Tribunal to settle disputes over, amongst other matters, land drainage. Smaller scale flooding affecting the highway or coming from the highway will continue to be investigated primarily by WCC Highways, with support from the LLFA team and Districts and Boroughs where land drainage issues exist.

These guidelines set numerical thresholds. However, in recognition of the fact that all floods will be different, a certain amount of discretion will be required in order to implement this policy effectively.

It is not our intention that no support will be provided to residents whose flooding does not meet these levels of prioritisation. Where time permits it, we may be able to attend the site, but the expectation is that this advice will be provided either on the

telephone or via guidance notes placed on the WCC flooding website. This advice may include the possibility of fitting some form of flood resilience device or contacting the relevant landowners directly if maintenance is an issue. In the County Council's experience of flood risk management, better results are usually achieved when adjoining landowners work together, rather than against one another, to resolve a flooding issue. Beyond this, there is the option to pursue civil proceedings. Agricultural Land Tribunals have an important role in settling disputes referred to them under the Land Drainage Act (LDA) 1991 (see Sections 28-31 of the LDA), such as flooding caused by blocked drainage channels or inadequately drained land. In spite of its name, this tribunal can deal with drainage on all types of land, not just agricultural land. The tribunal has powers to order a landowner to carry out work to maintain or reinstate drainage ditches. Enforcement of Land Tribunal Orders is undertaken by the Environment Agency; however, few reach the point of requiring enforcement action. It is currently free to make an application to the Agricultural Land Tribunal. However you will need to cover the costs of providing maps and other information, and may also wish to hire legal representation. Further information is available from the Defra [website](#)¹.

We would advise that residents continue to monitor the situation and if possible keep photographs and detailed records of any future flooding incidents that may occur. If the frequency or severity of the flooding increases to the point where it then falls under one of the high priority categories, the FRM team will then already have detailed evidence related to the flooding when an investigation commences.

An example of our standard questionnaire for collecting information from property owners following a flood event is included in Annex 1. This sets out what information it will be useful to record to allow us to fully investigate a flooding incident.

Annex 2 sets out the standard structure of a WCC FRM Section 19 flood investigation report in Warwickshire. This outlines what we expect would be included in a typical report produced by the FRM team following the conclusion of an investigation into flooding in a particular location.

¹ <http://archive.defra.gov.uk/foodfarm/farmmanage/alt/>

Annex 1 – Flood Investigation Questionnaire



Investigations under the Flood and Water Management Act (2010)

This questionnaire will inform our understanding of how flooding has affected residents and businesses in the Borough and where possible, actions that can be taken by all parties to reduce the future chance and/ or impact of flooding.

Results may be shared as appropriate with other professional partners e.g. Environment Agency, Severn Trent Water so that the Council can work in partnership to address flooding issues. Information will not be published following an investigation at a level that will allow individual properties or persons to be identified.

Date

Name

Property address and contact details

Type of property (residential/ business / both – eg. Running a business from home / other – please state)

How many years have you lived in or worked at the property?

Do you have any elderly / disabled / vulnerable residents living in the property (provide details)?

What was affected and how often? (please note dates of flooding)

Internal		External	
Rooms		Front garden	
Cellar		Back garden	

Under floor		Drive	
Depth		Outbuilding	
		Road/ path	
		Depth	

What impact did the flooding have?

Internal		External	
No visible damage		Minimal effect	
Damage that is repairable		Significant damage	
Loss of carpets, fixtures and fittings		Infrastructure	
Property uninhabitable		Damage to crops	
Damage to stock		Loss of access in and out	
Loss of business		Disruption to services	

What was the cost of damage and loss?

How often does flooding occur?

What do you think is the source?

Watercourse	
Overland runoff	
Overflowing drains	
Overflowing sewers and/ or septic tanks	
Groundwater	
Other	

Not sure	
----------	--

What other flooding are you aware of in your area?

What action have you taken in response to flooding or the potential for flooding?

Signed up for flood warnings	
Monitored forecasts (how)	
Contacted someone (who and what action was taken)	
Sandbagging	
Other actions (what)	
Other flood protection products (what)	
Moved possessions	
Moved car	
Warned others	
Evacuated	

If you received a warning or information from someone else, who gave you this and how did you receive it?

What do you think would be helpful in future?

Do you have any further comments?

Please return this form to Michael Green, Flood Risk Manager, PO Box 43, Shire Hall, Warwick CV34 4AS

If you have any queries about completing this form, please phone 01926 412711 or 01926 412781.

Annex 2 – Flood Investigation Report Structure

1 Introduction

1.1 Lead Local Flood Authority Duty to Investigate

1.2 Site Location

1.3 Flooding Incident and Emergency Response

1.4 Watercourses and Drainage Systems

2 Flooding History

2.1 Previous Flooding Events

3 Data Collection and Analysis

3.1 Data Collection

3.2 Professional Partner Investigations

3.3 Flooding Mechanisms

3.4 Flooding Impacts

4 Conclusions and Recommendations

Introduction

This document has been agreed as the Warwickshire County Council Sandbag Policy and approved by the Head of Localities and Community Safety on behalf of the Strategic Director for Communities.

Aim

The aim of the sandbag policy is to formalise County Council principles and procedures for the distribution of sandbags across Warwickshire.

Objectives

- To clarify Warwickshire County Council's policy and procedures for partners and the public.
- To establish a standardised County Council procedure for responding to requests for sandbags from partners and the public.
- To ensure the County Council is able to protect critical national infrastructure and support partners through the strategic distribution of available resources.

Sandbag Provision

Warwickshire County Council, through County Highways, maintains a limited stock of sandbags prioritised for use on County roads to protect properties flooding from the highway and ensure road safety.

Owners of infrastructure and priority services are responsible for protecting their assets from flooding and maintaining service provision. During extreme flood events Warwickshire County Council will consider the need and capability to support this through strategic use of stock at priority sites across the county. This allocation is strictly subject to available stock and competing priorities but where possible will include:

- Critical national infrastructure sectors including health, transport, energy, water and communications.
- Housing for vulnerable people including residential/care homes and sheltered accommodation.
- County Council owned property.
- Supporting local partners.
- Public/community buildings (subject to assessment)

The County Council will consider requests for support from Districts and Borough Councils through the Resilience Team's 24/7 Duty Officer; requests will be considered and prioritised based on likely impacts and current/forecast conditions across Warwickshire. The County Council will do all it can to support partners on a best endeavours basis however support may not be possible and therefore cannot be assumed.

Whilst Local Authorities do not have a duty to provide sandbags to the public, the County Council, through its Resilience Team, annually offers 200 unfilled sandbags to all Parish/Town Councils and established Community Groups within Warwickshire free of charge. A request for additional sandbags may be made throughout the year if the original supply has been used during a flood event. Those accepting this offer are expected to store them in a suitable environment and make them available to their community in the event of local flooding.

This method of support is practical for provision, storage and protection of large quantities of sandbags and ensures they are readily available within the communities that need them when required. Those requesting this allocation are expected to ensure they can distribute empty bags or fill and deploy them safely as part of their emergency arrangements.

The Resilience Team encourages everyone to be aware of the flood risk in their area and take any appropriate measures to protect themselves and their property such as purchasing their own flood protection equipment prior to a flood event. Further information on how to do this is available online from the Environment Agency and National Flood Forum Blue Pages directory.

Public requests for sandbag support and further information regarding the policy and arrangements in your area should be directed to the appropriate District, Borough and Parish/Town Councils.

Sandbag Disposal

Once the risk of flooding has passed it is the responsibility of those who received sandbags to either retain unused/clean bags for future use or safely and appropriately dispose of used/contaminated bags. Disposal of used bags is supported at Household Waste Recycling Centres across Warwickshire strictly upon prior arrangement with the County Council Waste Management Team.

Local Flood Risk Management Strategy

Consultation Methodology

Background

Under changes made in the Flood and Water Management Act of 2010, Warwickshire County Council is the Lead Local Flood Authority (LLFA) responsible for managing local flood risk from surface water, groundwater and ordinary watercourses in the county. It must assist in the management of local flood risk and develop, monitor and apply a Local Flood Risk Management Strategy.

There has already been some informal consultation with partners through the Flood Summit, the Strategic Flood Forum and the county-wide engagement meetings which were part of the Community Flood Resilience Pathfinder project.

The formal county-wide consultation, which is the subject of this document, will consist of two rounds; the first beginning in early January which will run for 11 weeks until March. In this, the Local Flood Risk Management Strategy will engage with the public giving accurate information, mythbusting and taking the views of partners and residents.

During the first round of consultation, the draft Surface Water Management Plan (or SWMP, an Appendix to the Strategy) will outline the methodology for prioritising flooding locations across the county and the Strategic Environmental Assessment (SEA) Scoping Report will also be published. A summary of consultation responses will be published on the WCC website. The prioritized list in the final SWMP and the full SEA will form part of a second round of consultation later in 2015 which will incorporate comments made during the first round.

Objectives of the consultation

- To engage with key influencers on the Local Flood Risk Management Strategy to disseminate message to residents.
- To engage with the public about what plans are in place to manage flood risk in Warwickshire.
- To get initial feedback from the public about the Strategy and Surface Water Management Plan.
- To engage with businesses about flood risk management.
- To then feed the findings of the consultation to the second consultation to run in the summer of 2015.

Link to corporate plan

- Develop a society that looks after its most vulnerable residents and seeks opportunities for economic growth and innovation.
- Our communities are safe and protected from harm.
- Protecting health and wellbeing of all residents.

Audiences

- Residents who engage with the county council - residents who take an active interest in local affairs eg local members, town and parish councillors.
- Residents who are harder to reach who do not engage with the council or other local agencies.
- Businesses - flood is a major risk for businesses in Warwickshire.

Messaging

- Media. We can use the local media to flag up that there is a consultation and to highlight some of the points within it to promote the message that WCC is the Lead Local Flooding agency and that it is working to protect the people of Warwickshire.
- Face to face engagement with simplified version of the key points of the strategy for discussion.
- The key messages and sections will be brought out through an accompanying questionnaire to gauge people's reactions to the objectives and measures and the method for prioritising local flood risk and flood investigations.
- The Executive Summary, Section 1 (Introduction), and Section 2 (Objectives and Measures) will form the Summary of the Local Flood Risk Management Strategy.

Activities and channels

- News releases and feature articles flagging up consultation (external media, website, social media, Ask Warwickshire, Warwickshire Means Business partners).
- Public meetings such as community fora where we will be allowed to put information and can request that the chair makes the audience aware.
- Arranged public meetings where Communities Group staff attend public areas.
- Social media: As well as the social media channels of the county council, we can make links with partners' social media channels such as Warwickshire Fire and Rescue Service's twitter and facebook and engage with their followers.
- Information at public libraries.