Appendix F – Cumulative Impact Assessment

This section provides a summary of the catchments where the level of flood risk and development pressures mean they could be affected by cumulative impacts and identifies recommendations for local planning policy for Warwick District Council so the impacts are addressed.

1 Background

1.1 Introduction

The cumulative impact of development should be considered at both the Local Plan making and the planning application and development design stages. Appropriate mitigation measures should be implemented so flood risk is not exacerbated, and where possible the development should be used to reduce existing flood risk issues.

To understand the impact of future development on flood risk in Warwickshire and Coventry, catchments were identified where cumulative development may have the greatest potential effect on flood risk, and where further assessment would be required within a Level 2 Strategic Flood Risk Assessment (SFRA) or site-specific Flood Risk Assessment (FRA). The potential change in developed area within each catchment and communities sensitive to increased risk of surface water flooding, alongside evidence of historic flooding incidents have been considered to identify catchments at the highest risk. Where catchments have been identified as sensitive to the cumulative impact of development, the assessment concludes with recommended strategic planning policy suggestions to manage the risk.

1.2 Strategic flood risk solutions

Warwick District Council (WDC) have a vision set forth in their Local Plan for the future management of flood risk and drainage in the region. The plans consider flood risk management, alongside wider environmental and water quality enhancements. Strategic solutions may include upstream flood storage, integrated major infrastructure/ Flood Risk Management (FRM) schemes, new defences, and watercourse improvements as part of regeneration and enhancing green infrastructure, with opportunities for natural flood management and retrofitting sustainable drainage systems. **The Warwickshire Local Flood Risk Management Strategy**, **Severn River Basin District Flood Risk Management Plan** and **River Severn Catchment Flood Management Plan** set out specific actions for the authority region.

Section 2 sets out the strategic plans that exist for the authority region. The following list summarises the key outcomes these strategies are seeking to achieve. It is anticipated that this vision will be delivered by new

development alongside retrofitting and enhancing green infrastructure and flood defence schemes in the existing developed area.

The strategic policy vision from the Catchment Flood Management Plan (CFMP) and the River Basin Management Plan (RBMP) focus on community engagement and seeking opportunities to fund and deliver flood alleviation schemes in areas deemed high-risk; re-naturalising watercourses, safeguarding the floodplains and encouraging collaboration and creating new partnerships to reduce the risk of flooding and to enhance the natural environment. Within Warwick District, strategic solutions encourage development that:

- Prevents deterioration of the status of surface water and groundwater;
- Aims to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological status and good surface water chemical status;
- Reverses any significant and sustained upward trends in pollutant concentrations in groundwater;
- Decreases discharges, emissions and losses of priority hazardous substances into surface waters;
- Progressively reduces the pollution of groundwater and prevent or limit the entry of pollutants;
- Reduces the risk to people, economic damage and community disruption;
- Uses sustainable flood storage and mitigation schemes to store water and manage surface water runoff in locations that provide overall flood risk reduction as well as environmental benefits;
- Engages with a variety of stakeholders across the region to develop plans and seize opportunities for collaborative partnership working;
- Provides a greater role for communities in managing flood risk;
- Improves knowledge and understanding of flood risk and management responsibilities, and of watercourse networks and drainage infrastructure;
- Promotes sustainable and appropriate development;
- Delivers flood risk management measures that have social, economic and environmental benefits;
- Identifies opportunities to use areas of the floodplain to store water during high flows and reduce long term dependence on engineered flood defences;
- Uses SFRAs to inform future development and minimise flood risk from all sources;
- Implements upstream catchment management e.g. slow the flow and flood storage schemes could be implemented in upper catchments to reduce flooding downstream and across neighbouring authority boundaries; and

- Promotes and considers Sustainable Drainage Systems (SuDS) at the earliest stage of site development.

In some locations, the Environment Agency (EA) has committed to assist Local Planning Authorities (LPAs) in identifying areas which may be most affected by increased flood risk due to development and/or climate change. However, this work is stated to likely fall short of extensive hydraulic modelling and detailed mapping of theoretical flood extents. The headline message is therefore:

Flood risk is increasing, perhaps substantially, so Planners, Emergency Planners, Asset Managers and others will need to mitigate this through a mix of collaborative working, planning policies, use of 'worst case' scenarios, development of contingency plans and some detailed analysis.

1.2.1 Opportunities and projects in / affecting Warwick

There are currently no known plans for future flood defence or alleviation within Warwick District. Severn Trent Water recently announced its intention to improve 500km of Rivers across Warwickshire as part of their **Green Recovery Plan**, and there are likely to be opportunities to reduce flood risk alongside these plans.

Despite limited large scale plans, there are likely to be many smaller opportunities to deliver benefits through the retrofitting of SUDS in urban areas and natural flood management in upper catchment areas. Additionally, development presents opportunity to provide benefits beyond the site boundaries, for example through the provision of oversized SUDS or post-development reductions in runoff rates.

Specific recommendations and areas likely to benefit are included as part of the policy recommendations in Section 2 of this assessment.

The Warwick District is already included in the **Warwickshire, Coventry and Solihull Local Nature Partnership (LNP)**. The following are other stakeholders and project delivery schemes affecting the District.

Warwickshire Avon Catchment Partnership:

The **Warwickshire Avon Catchment Partnership** is the associated Catchment Based Approach (CaBA) catchment partnership for the 'Warwickshire Avon' catchment. The partnership focuses on 7 priority areas:

1. Coventry Brooks and Rivers
2. River Stour catchment including tributaries
3. River Alne Source to Confluence with Preston Bagot Brook
4. River Arrow
5. Upper River Avon, Rains Brook and Upper River Leam

6. Forest of Feckenham

7. Carrant Brook

The Warwickshire Avon Partnership is a collaboration between relevant partners to deliver projects that will improve the health of the area's rivers and wetland environments.

Their key priorities are:

- To co-ordinate action through liaison with a range of partners.
- To endorse priority projects identified in the Delivery Action Chart which are delivering multiple benefits including enhancing ecological condition, addressing flood issues, and promoting involvement and education on catchment priorities.
- To communicate the Catchment Plan and projects to key audiences e.g. liaise with landowners to engage their active support with practical projects, and to facilitate the creation of more feasibility studies for larger scale flood risk reduction or river enhancement schemes.
- To inform stakeholders and the public of priorities, planned actions and achievements.
- To deliver practical improvements at a minimum of two priority sites per year across the catchment and priority areas and use these as demonstration sites to encourage further action.
- To secure funds and resources to deliver projects on the ground.
- To engage with major stakeholders and developers to deliver enhancements.
- To monitor and report on results achieved and progress across the catchment.

Warwickshire, Coventry and Solihull Sub-Regional Green Infrastructure Strategy

The Warwickshire, Coventry and Solihull Sub-Regional Green Infrastructure Strategy is a Strategy that aims to provide evidence for the preparation of plans, policies and strategies relating to Green Infrastructure (GI) at a sub-regional level and local level. The strategy also details how landholders and partners can help with the delivery of GI. The desired outcome is a comprehensive, interactive and highly flexible evidence base, which can be used for a range of purposes:

- A framework for the sustainable land management of the area;
- A tool for predicting the implications of change on the natural environment;
- Informing the sustainable management of the historic environment and the
- conservation and enhancement of heritage assets;

- An accurate picture of the green infrastructure of an area – essential in making
- planning decisions, informing developments and strategies;
- A tool for delivering the natural environmental contribution to identified priorities in the
- fields of health, economy and quality of life;
- A structured plan for delivering environmental change;
- Attracting funding by demonstrating researched needs and outcomes;
- Attracting inward investment; and
- Assisting priority setting for neighbouring authorities in areas of common interest.

Habitat Biodiversity Audit (HBA)

The Habitat Biodiversity Audit (HBA) is a partnership project established in 1995. It is managed by Warwickshire Wildlife Trust and funded by local authorities. The project is based in Warwickshire County Council's Ecological Services offices in Warwick and provides both up to date accurate records of habitats and a record of changes in land use over time. The European Committee of Regions (2006) described the HBA as the "only recognised best practice model for monitoring and auditing biodiversity". The HBA is updated annually with surveying ongoing.

The **Wildlife Sites Project** is part of the HBA Partnership. This project began 1999 and aims to develop and maintain a formal local wildlife sites system for Warwickshire as part of a wider initiative with Coventry and Solihull. The Warwickshire Wildlife Sites data can be found **here**.

Warwickshire Wildlife Trust Nature Reserves

Warwickshire Wildlife Trust manage 12 Nature Reserves within the Warwick District. These are:

- Oakwood and Blacklow Spinney
- Whitnash Brook
- Oakley Wood
- Hunningham Meadow
- Leam Valley
- Welches Meadow
- Bubbenhall Wood and Meadow
- Wappenbury Wood
- Knowle Hill
- Kenilworth Common
- Parliament Piece
- Crackley Wood

These sites are home to various important and protected habitats and species, including:

- Wetland
- Woodland
- Yellow iris
- Glow worm
- Teal snipe
- Wild angelica
- Kingfisher
- Roach

- Tawny owl
- Wood anemone
- Grass snake
- Snake's head fritillary
- Cowslip
- Muntjac deer
- Purple hairstreak
- Opposite-leaved golden saxifrage
- Stinkhorn fungus
- Cow parsley

Natural Flood Management techniques could be encouraged at some of the reserves to aid flood storage and improve natural habitats.

1.3 Assessment of Cross-Boundary Issues

This assessment has been undertaken covering six Local Authority areas; Rugby, Warwick, Stratford-on-Avon, Nuneaton and Bedworth, Coventry, and North Warwickshire Districts (referred to collectively as the Warwickshire Authorities in this report). Catchment covering Warwick District also cross into the following neighbouring Authorities (see Figure 1.1 in the main report for the Local Authority boundaries):

- City of Coventry
- Solihull Metropolitan Borough
- Rugby Borough
- Stratford-on-Avon District

The east and central area of the Warwick District is predominantly low-lying floodplain interspersed with hills of approximately 100m AOD that the main River Avon and River Leam flow through. The west is dominated by higher elevations of approximately 130m AOD. The major settlements of Royal Leamington Spa and Warwick are located in the low-lands where the River Leam joins the River Avon. In the south of the district, several smaller tributaries to the River Avon drain into Warwick from Stratford-on-Avon. To the northwest, some small tributaries of the River Blythe drain form Warwick into Solihull, and development within Warwick has the potential to impact on flood risk within Solihull.

As such, future development, both within and outside of Warwick can have the potential to affect flood risk to existing development and surrounding areas, depending on the effectiveness of SuDS and drainage implementation.

Development control should ensure that the impact on receiving watercourses from development in Warwick has been considered appropriately during the planning stage and appropriate development management decisions put in place to ensure there is no adverse impact on flood risk or water quality. All developments are required to comply with the NPPF and demonstrate they will not increase flood risk elsewhere. Therefore, providing developments near watercourses in neighbouring authorities comply with the latest guidance and legislation relating to flood risk and sustainable drainage, they should result in no increase in flood risk within Warwick. The neighbouring authorities were contacted for information

on their site allocations, to determine where development in neighbouring authorities may have an impact on.

Stratford-on-Avon District Council and Warwick District Council are currently working together to prepare a new **Local Plan for South Warwickshire**. This plan will replace the Stratford-on-Avon Core Strategy and Warwick Local Plan. This South Warwickshire Local Plan is currently in the consultation stage. Therefore, the evidence base, the flood risk and sustainable drainage policies in the adopted Local Plan/Core Strategy (2011-2031) have not yet been updated to ensure compliance with the NPPF.

The following Local Plans have been adopted by neighbouring local authorities and include policies relevant to flood risk and drainage:

- **Stratford-on-Avon District Council's Core Strategy** (2016-2031, currently under review, due end unknown)
- **Rugby Borough Council's Local Plan** (2011 – 2031)
- **Solihull Metropolitan Borough Council's Local Plan** (2011 – 2028)
- **Coventry City Council's Local Plan** (2011 – 2031)

For the CIA, the Warwickshire Authorities, including Warwick, were assessed at a sub-catchment level. (see Figure F-1).

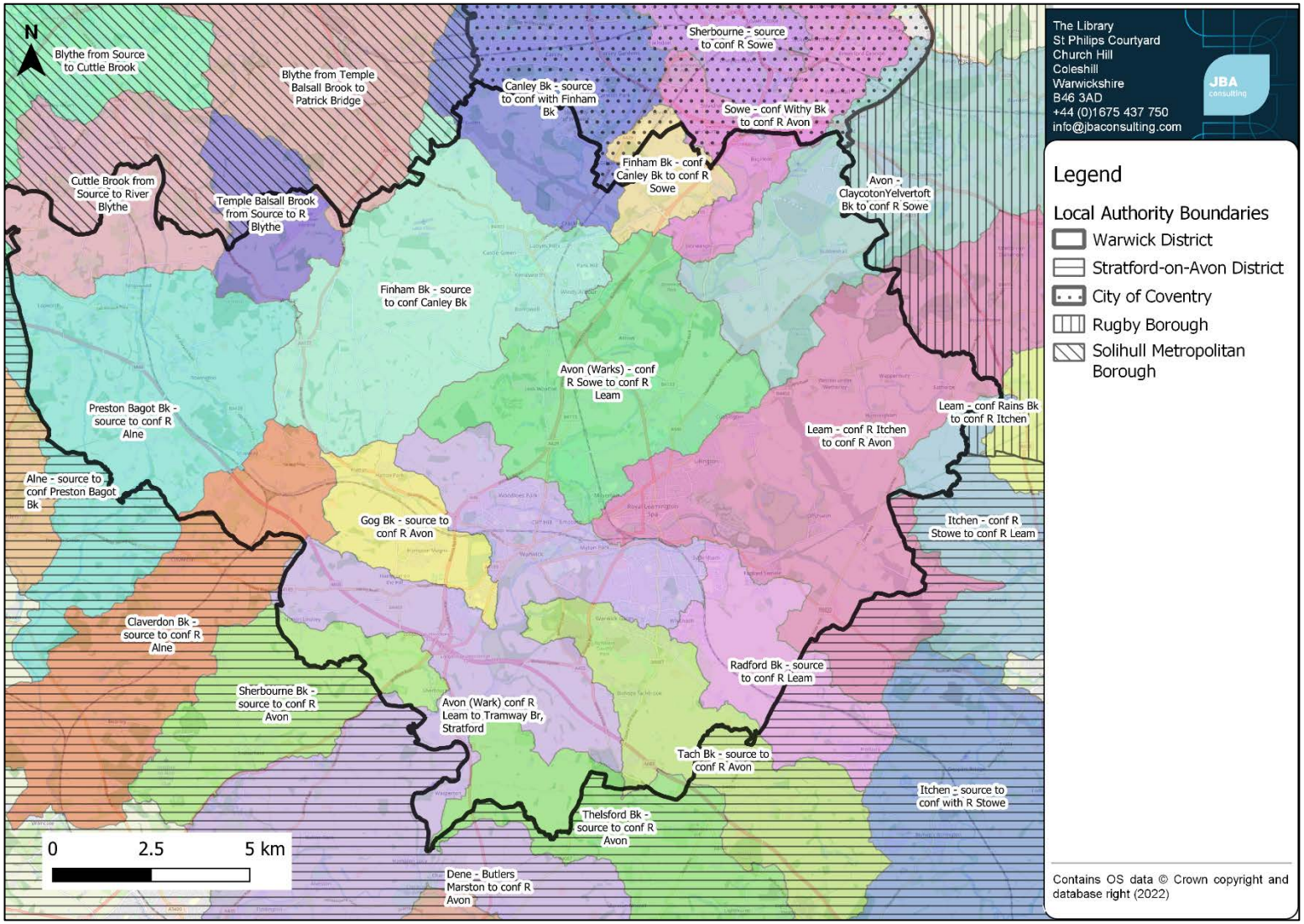

Figure F-1: Catchments within Warwick District.

1.4 Cumulative Impact Assessment Methodology

This broadscale assessment determines where the potential cumulative impact of developments may have the greatest effect on flood risk across the study area. Catchments at the highest risk are taken forward to a catchment-level analysis. Potential change in developed areas within each catchment from neighbouring authorities was also considered. In this instance, historic records of flooding events were not available, however some baseline records were derived from recent Section 19 reports and a supplied asset register. The recorded incidents from these provide a general overview but were included in the assessment. Analysis of this data facilitated the identification of catchments at the greatest risk of cumulative impacts of an increase in impermeable area within the catchment.

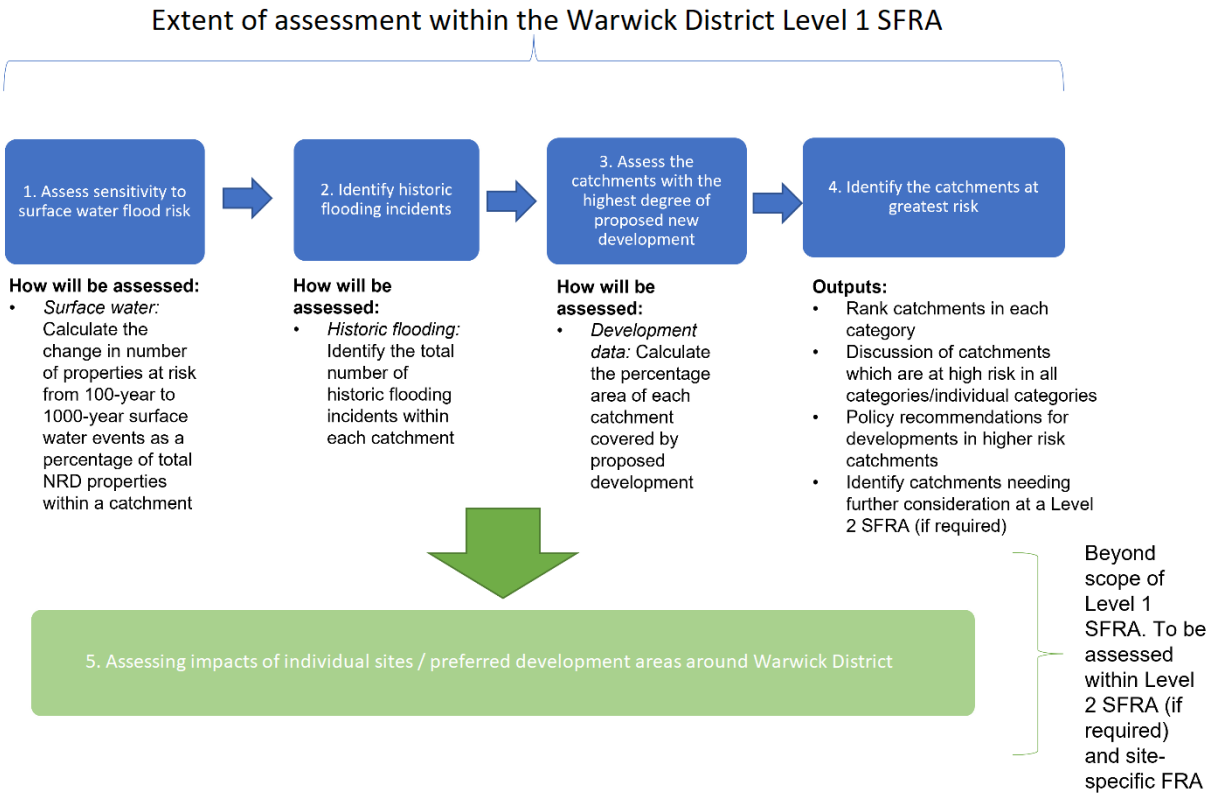

Figure F-2: Overview of the method used within the Cumulative Impact Assessment

Figure F-2 shows the methodology used and Table F-1 summarises the datasets used within the Warwickshire cumulative development scenario.

Future development sites within the study area were provided by the Warwickshire Authorities. Catchments within the study area were initially ranked using the following five metrics: sensitivity to increased fluvial flood risk; prevalence of recorded historic flood incidents (limited by the data available); prevalence of historic sewer flooding instances; sensitivity to increased risk of surface water flooding; and area of new development proposed within the catchment.

The final results of this assessment gave a cumulative impact rating of low, medium, or high for each metric, for each catchment within the study area, the boundaries of which were derived from WFD. The rating of each catchment in each of these assessments was combined to give an overall ranking.

1.4.1 Sensitivity to increases in surface water flooding

For the purpose of the CIA this is the measure of the increase in the number of properties at risk of surface water flooding from a 1 in 100-year event to a 1 in 1,000-year event. It is an indicator of where local topography makes an area more sensitive to increases in flood risk that may be due to any number of reasons, including climate change, new development etc. It is not an absolute figure or prediction of the impact that new development will have on flood risk, but rather an indicator of the sensitivity of receptors to cumulative effects.

The National Receptor Database (NRD) dataset 2021 was used to identify all properties within the study area.

This data was analysed for the 1,000-year and 100-year surface water flood extents respectively to determine the number of properties in each catchment, in each surface water flood extent. The difference between the two values was then taken as a percentage of the total number of properties within the catchment to allow comparison between catchments of different sizes.

1.4.2 Sensitivity to increases in fluvial flooding

For the purpose of the CIA this is the measure of the increase in the number of properties at risk of fluvial flooding from a 1 in 100-year event to a 1 in 1,000-year event. It is an indicator of where local topography makes an area more sensitive to increases in flood risk that may be due to any number of reasons, including climate change, new development etc. It is not an absolute figure or prediction of the impact that new development will have on flood risk, but rather an indicator of the sensitivity of receptors to cumulative effects.

The National Receptor Database (NRD) dataset 2021 was used to identify all properties within the study area.

This data was analysed using Flood Zone 2 (1,000-year event) and Flood Zone 3 (100-year event) to determine the number of properties in each catchment, in each Flood Zone. The difference between the two values was then taken as a percentage of the total number of properties within the catchment to allow comparison between catchments of different sizes.

1.4.3 Growth in the area

Development within authorities has the potential to affect flood risk in neighbouring authorities, especially if there are existing flood risk issues.

Areas for future proposed development were received from the Warwickshire Authorities and were assessed as part of this CIA. The area of potential new development within each catchment was expressed as a percentage of the

total catchment area to determine the potential for increase in flood risk as a result of new development.

1.4.4 Historic flood risk

Recorded flooding events data for fluvial or surface water flooding within the study area was provided by Warwickshire County Council as LLFA. Data was filtered to only include incidences where property was affected. Details of historic flood events can be found in Section 5.1 of the main SFRA report. Each point represents a location where it is known there has been at least one flood event (however, the nature and scale of these flood events varies significantly).

A count of each historical flood incident was conducted for each catchment to determine the historic flood risk of the catchments.

1.4.5 Historic sewer flooding incidences

Recorded sewer flooding events data was provided by Severn Trent Water. Data was filtered to only include incidences where properties were affected. Each point represents a location where it is known there has been at least one flood event (however, the nature and scale of these flood events varies significantly).

A count of each historical flood incident was conducted for each catchment to determine the historic flood risk of the catchments.

A summary of the datasets used to calculate the historic flood risk and the sensitivity to increases in flood flows for each catchment is shown in Table F-1.

Table F-1-1 Summary of datasets used within the Broadscale Cumulative Impact Assessment

Dataset	Coverage	Source of Data	Use of Data
Catchment Boundaries	Warwickshire Study Area	Water Framework Directive Catchments	Assessment of susceptibility to cumulative impacts of development by catchment.
National Receptor Dataset (2021)	Warwickshire Study Area	Environment Agency	Assessing the number of properties at risk of surface water flooding within each catchment.
Risk of Flooding from Surface Water	Warwickshire Study Area	Environment Agency	Assessing the number of properties at risk of surface water flooding within each catchment.
Fluvial Flood Zones 2 and 3	Warwickshire Study Are	Environment Agency	Assessing the number of properties at risk of fluvial flooding within each catchment
Future development areas (recently built out sites/sites under construction/sites	Warwickshire Study Area	Rugby Borough Council, Warwick District Council, Stratford-on-Avon District Council,	Assessing the impact of proposed future development on risk of flooding.

Dataset	Coverage	Source of Data	Use of Data
with planning permission/previously allocated sites/currently allocated sites)		Nuneaton and Bedworth Borough Council, Coventry City Council, and North Warwickshire District Council.	
Historic Flooding Incidents and Sewer Flooding Incidents	Warwickshire Study Area	Warwickshire County Council, Coventry City Council, Severn Trent Water	Assessing incidences of historic flooding within the study area.

1.4.6 Ranking the results

The ranking results were combined from all five metrics to give an overall High, Medium and Low ranking for all catchments within the study area. The results for each assessment were ranked into High, Medium and Low risk as shown in Table F-2. Ranking delineations were given at natural breaks in the results.

Table F-1-2: Ranking assessment criteria

Flood risk ranking	% of properties at increased risk of fluvial flooding	% of properties at increased risk of SW flooding	No. of Recorded Historic Flooding Incidents	No. of Recorded Sewer Flooding Incidents	% Area of Catchment Covered by new development
Low	<3%	<3%	0	<5	<4%
Medium	3 to 5 %	3 to 5 %	1-5	6-10	4 to 10%
High	>5%	>5%	>5	>10	>10

1.4.7 Assumptions

The assumptions made when conducting the cumulative impact assessment are shown in Table F-3.

Policy recommendations with regards to managing the cumulative impact of development are described in Section 2.2 of the CIA. Appropriate policies will address the issue of incremental increase due to cumulative effects in flood risk both within and downstream of Warwick.

Table F-1-3: Assumptions of the cumulative impact assessment

Assessment aspect	Assumption made	Details of limitation in method	Justification of method used
Surface water flood risk; Flood Zone 2 and 3	Total number of properties flooded	Assumption that all properties have been included in the 2021 NRD dataset. It may not include all new build properties.	This was the most up to date and best data available.
Historic Flooding incidents	Total number of historic events and severity of flooding	Only flooding incidents recorded that could be georeferenced with XY coordinates to produce GIS files.	GIS data sourced provided the best available results for the location of historic

		Each point represents a location where it is known there has been at least one flood incident. The severity of the historic flooding event relating to the point has not been considered, just the total number of points within each catchment where there has been a flood incident.	flooding incidents in the study area.

1.5 Cumulative Impact Assessment

1.5.1 Sensitivity to fluvial flooding

The number of properties within Flood Zone 2 not presently within Flood Zone 3 was taken, as a percentage of the total properties in the catchment. These properties are considered sensitive to increased flood risk as a result of climate change.

Catchments with greater than 5% properties at increased risk were considered high risk.

Table F-1-4 Warwickshire and Coventry catchments considered highly sensitive to increased fluvial flood risk in future

Catchment	% properties sensitive to increased fluvial flood risk	Rank
Arrow - Spernall Hall Farm, Studley to confluence with River Alne	11.9%	1
Alne– confluence with Preston Bagot Brook to confluence with Claverdon Brook	7.9%	2
Alne - source to confluence with Preston Bagot Brook	7.8%	3
Arrow – confluence with River Alne to confluence with River Avon	7.7%	4
Knee Brook - source to confluence with Blockley Brook	7.6%	5
Leam – confluence with River Itchen to confluence with River Avon	6.2%	6
Avon– confluence with River Sowe to confluence with River Leam	5.9%	7

1.5.2 Sensitivity to surface water flooding

The number of properties within the 1000-year surface water extent not presently within the 100-year extent was taken, as a percentage of the total properties in the catchment. These properties are considered sensitive to increased flood risk as a result of climate change.

Catchments with greater than 5% properties at increased risk were considered high risk.

Table F-1-5 Warwickshire and Coventry catchments considered highly sensitive to increased surface water flood risk in future

Catchment	% properties sensitive to increased surface water flood risk	Rank
Marchfont Brook - source to confluence River Avon	11.7%	1
Knee Brook - source to confluence Blockley Brook	8.3%	2
Knee Brook - confluence Blockley Brook to confluence River Stour	6.4%	3
Dene - Butlers Marston to confluence River Avon	6.0%	4
Itchen - source to confluence with River Stowe	5.9%	5
Tadmarton Stream (Source to Sor Brook)	5.9%	6
Dene - source to Butlers Marston	5.5%	7
Alne confluence Preston Bagot Brook to confluence Claverdon Brook	5.4%	8
Leam - source to confluence Rains Brook	5.4%	9
Stour (Warks) - source to confluence Nethercote Brook	5.2%	10
Nethercote Brook - source to confluence River Stour	5.1%	11
Alne - confluence Claverdon Brook to confluence River Arrow	5.1%	12

1.5.3 Prevalence of historic flooding incidents

Historic flood incidents data for fluvial or surface water was available for this assessment from Warwickshire County Council. Data was filtered to include only flooding that affected properties. While this will not provide a detailed scope of historic flooding incidents across the region, the number of flood incidents in each catchment from the data available were identified to provide a broadscale understanding of flood risk. Catchments with more than 5 recorded incidents were considered high risk.

Table F-1-6 Warwickshire and Coventry catchments with the highest number of recorded historic flood incidents

Catchment	Number of recorded incidents	Rank
Avon confluence River Leam to Tramway Br, Stratford	20	1
Leam - confluence River Itchen to confluence River Avon	16	2
Arrow - Spernall Hall Fm, Studley to confluence River Alne	16	2

Catchment	Number of recorded incidents	Rank
Avon- Tramway Br Stratford to Workman Br Evesham	7	4
Preston Bagot Brook - source to confluence River Alne	7	4
Leam - confluence Rains Brook to confluence River Itchen	6	6
Tame from River Blythe to River Anker	6	6

1.5.4 Prevalence of sewer flooding incidents

Records of sewer flooding incidents were available for this assessment from Severn Trent Water Data was filtered to include only flooding that affected properties. Catchments with more than 10 recorded incidents were considered high risk.

Table F-1-7 Warwickshire and Coventry catchments with the highest number of recorded historic flood incidents

Catchment	Number of recorded incidents	Rank
Leam - confluence River Itchen to confluence River Avon	49	1
Avon (Wark) confluence River Leam to Tramway Br, Stratford	39	2
Anker from Wem Brook to River Sence	32	3
Stour - confluence Nethercote Brook to confluence Back Brook	30	4
Avon – Claycoton-Yelvertoft Brook to confluence River Sowe	29	5
Avon- Tramway Br Stratford to Workman Br Evesham	28	6
Anker from River Sence to River Tame	28	6
Finham Brook - source to confluence Canley Brook	25	8
Sow Brook - source to confluence River Avon	25	8
Avon - confluence River Sowe to confluence River Leam	21	10
Stowe - source to confluence River Itchen	21	10
Clifton Brook - source to confluence River Avon	21	10
Tame from River Blythe to River Anker	20	13
Sherbourne - source to confluence River Sowe	20	13

Catchment	Number of recorded incidents	Rank
Cole from Hatchford-Kingshurst Brook to River Blythe	20	13
Wem Brook from Source to River Anker	16	16
Canley Brook - source to confluence with Finham Brook	14	17
Withy Brook - source to confluence River Sowe	13	18
Dene - source to Butlers Marston	13	18
Sowe - confluence Withy Brook to confluence River Avon	13	18

1.5.5 Area of proposed development

The Warwickshire authorities provided a list of likely new development sites and the total area of new development in each catchment was measured, as a percentage of catchment area. Catchments with more than 10% of their area earmarked for development were considered high risk.

Table F-1-8 Warwickshire and Coventry catchments with the highest percentage cover of proposed development

Catchment	Area of proposed development (ha)	Area of proposed development (%)	Rank
Finham Brook - confluence Canley Brook to confluence River Sowe	266.6	40.9%	1
Tach Brook - source to confluence River Avon	441.8	16.6%	2
Radford Brook - source to confluence River Leam	190.2	12.1%	3
Sowe - confluence Breach Brook to confluence Withy Brook	303.4	11.5%	4
Marchfont Brook - source to confluence River Avon	373.0	11.3%	5
Clifton Brook - source to confluence River Avon	330.5	10.11%	6

1.6 Overall rankings

As can be seen from the above tables and Figure F-2, there are catchments that are at high risk in multiple categories. Rankings from each assessment have been combined to give an overall ranking. A Red-Amber-Green (RAG) rating was then applied to the catchments, with red being high risk, amber

being medium risk and green being low risk (Figure F-3). The catchments with a combined ranking score of less than 30 were deemed high risk.

The catchments rated as high-risk in the broadscale assessment, that lie within Warwick District, are shown in Table F-8.

Table F-1-9: High Risk catchments within Warwick District

High Risk catchments within Warwick
Avon (Warks) - confluence River Sowe to confluence River Leam
Avon (Wark) confluence River Leam to Tramway Br, Stratford
Alne - source to confluence Preston Bagot Brook
Sherbourne - source to confluence River Sowe
Leam - confluence Rains Brook to confluence River Itchen
Leam - confluence River Itchen to confluence River Avon

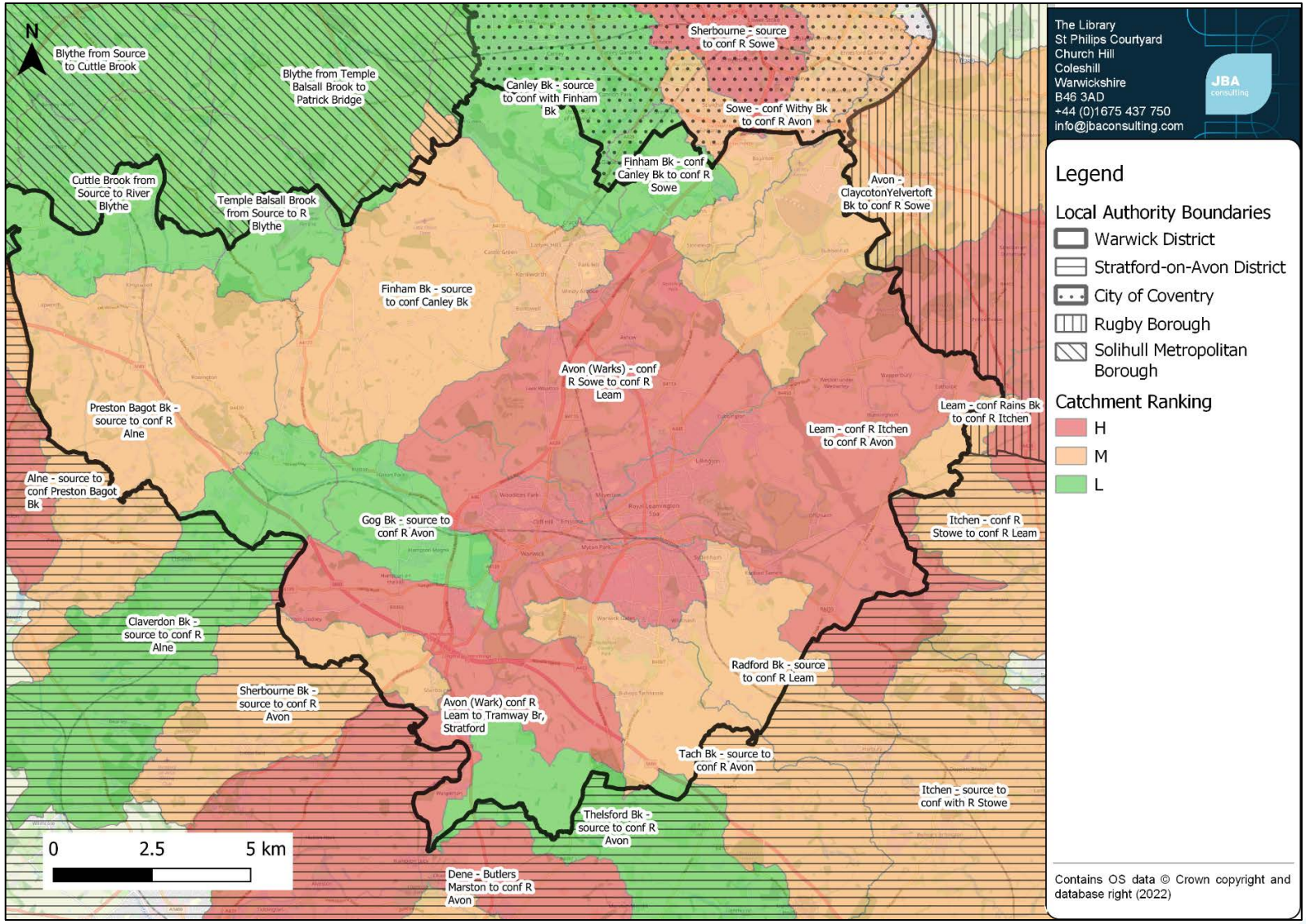

Figure F-3: Final catchment rankings of susceptibility to the impacts of cumulative impacts within Warwick District.

2 Policy Recommendations

2.1 Broadscale Recommendations

The broadscale cumulative impact assessment for Warwick has highlighted that the potential for development to have a cumulative impact on flood risk is moderately low across the area. Catchments have been identified as high, medium or low risk.

New development can potentially increase flood risk and thus the need for incremental action and betterment in flood risk terms across all of Warwick is appropriate.

The following policy recommendations therefore apply to all catchments within the study area:

- The Warwickshire Authorities should work closely with each other and neighbouring local authorities to develop complementary Local Planning Policies for catchments that drain into and out of the City to other local authorities in order to minimise cross boundary issues of cumulative impacts of development.
- Developers should incorporate SuDS and provide details of adoption, ongoing maintenance and management on all development sites. Proposals will be required to provide reasoned justification for not using SuDS techniques, where ground conditions and other key factors show them to be technically feasible. Preference will be given to systems that contribute to the conservation and enhancement of biodiversity and green infrastructure in the districts where practicable. Developers should refer to the relevant LLFA guidance (Warwickshire County Council) for the requirements for SuDS in Warwick, including Technical and Development Type-specific Guidance for Developers.
    - **Warwickshire Flood Risk & Sustainable Drainage Local Guidance for Developers**

Further guidance on SuDS can be found in Section 9 of the main SFRA report.

- Warwickshire County Council as LLFA will review Surface Water Drainage Strategies in accordance with their local requirements for major and non-major developments. These should take into account all sources of flooding so that future development is resilient to flood risk and does not increase flood risk elsewhere.
- Where appropriate, that the opportunity for Natural Flood Management in rural areas, SuDS retrofit in urban areas and river restoration should be maximised. Culverting should be opposed, and day-lighting existing culverts promoted through new developments.
- Runoff rates from all development sites must be limited to greenfield rates (including brownfield sites) for all sites unless it can be demonstrated that this is not practicable. If it is demonstrated that greenfield rates are not practicable then the runoff rates should be restricted to the closest rate that is practicable. Developers should refer to the relevant LLFA guidance for the requirements for SuDS in Warwick.

- Warwick District Council should consider requiring developers to contribute to community flood defences outside of their red line boundary to provide wider benefit and help offset the cumulative impact of development. There are proposed and ongoing Flood Alleviation Schemes which may help to reduce fluvial risk in the town centre, and there may be opportunities for development to support the funding/delivery of these schemes.

Section 8.3 of the main SFRA report details the local requirements for mitigation measures. Catchment-specific recommendations are made for high-risk catchments below.

2.2 Recommendations for medium and high-risk catchments

Medium Risk catchments are detailed in Table 2-1 below. High risk catchments are detailed in Table F-1-9. From analysing the results produced above, high-level recommendations to manage the risks of the cumulative impacts of development have been proposed for the medium and high-risk catchments. These recommendations include policy recommendations for the Local Authority and considerations for developers as part of site-specific proposals.

Table 2-1 Medium Risk Catchments within Warwick District

Medium Risk catchments within Warwick	
Dene - Butlers Marston to confluence River Avon	Preston Bagot Brook - source to confluence River Alne
Itchen - confluence River Stowe to confluence River Leam	Sherbourne Brook - source to confluence River Avon
Avon – Claycoton-Yelvertoft Brook to confluence River Sowe	Itchen - source to confluence with River Stowe
Radford Brook - source to confluence River Leam	Finham Brook - source to confluence Canley Brook
Sowe - confluence Withy Brook to confluence River Avon	Tach Brook - source to confluence River Avon

- Warwick District Council should work closely with the EA and the LLFA to identify any areas of land that should be safeguarded for any future flood alleviation schemes and natural flood management features, including land which may lie outside their boundaries.
- Warwick District Council should explore the potential for development in High-Risk catchments to contribute towards works to reduce flood risk and enable regeneration as well as contributing to the wider provision of green infrastructure.
- Warwick District Council, in discussion with Warwickshire County Council as LLFA should consider requiring additional betterment for runoff rates from brownfield sites, beyond those currently set. Currently, the Warwickshire Local Guidance for Developers states that

greenfield sites should limit runoff to greenfield rates whilst brownfield sites should reduce runoff to greenfield rates or achieve a minimum 50% reduction in runoff where it can be proved greenfield rates are not possible. More detailed modelling must be undertaken by the developer to ascertain the true storage needs and potential at each site at the planning application stage.

- For any sites where an FRA is required, developers should explore, through the site-specific FRA, opportunities to provide wider community flood risk & water resource benefits as part of new development and justify where such measures are not included. Measures that can be put in place to contribute to a reduction in flood risk downstream should be considered, with a focus on slowing the flow of water downstream, particularly in the upper catchment. This could include the provision of additional storage e.g. oversized SuDS and/or Partnership Funding contributions towards wider community schemes.
- Warwick District Council should consult with Local Non-For-Profit organisations such as wildlife trusts, rivers trusts and catchment partnerships to understand ongoing and upcoming projects where NFM, flood storage and attenuation, and environmental betterment may be possible alongside developments and aid in reducing flood risk.

2.2.1 Recommendations for Developments in High-Risk Catchments

Catchments that have been scored an overall ranking of high, should also consider the following recommendations:

- That a Level 2 SFRA or detailed local area Strategic Drainage Study considers further how the cumulative effects of potential peak rates and volumes of water from development sites would impact on peak flows, duration of flooding and timing of flood peaks on receiving watercourses. Such studies could be used to justify greater restrictions/ enforce through Local Planning Policy development site runoff rates and volumes specific to each catchment that are over and above those required by National and Local SuDS Standards. They could also identify where there are opportunities with allocated sites to provide off-site betterment e.g. online/ offline flood storage and where land should be safeguarded within proposed site allocations to fulfil this purpose.
- All development proposals should undertake a site-specific Flood Risk Assessment. Site-specific FRAs should explore opportunities to provide wider community flood risk benefit through new developments. Measures that can be put in place to contribute to a reduction in flood risk downstream should be considered. This may be either be by provision of additional storage on site e.g. through oversized SuDS, natural flood management techniques, green infrastructure and green-blue corridors, and/ or by providing a Partnership Funding contribution towards any flood alleviation schemes.
- That a Surface Water Drainage Strategy be required for all developments, regardless of development size. Developers should also

include a construction surface water management plan to support the Construction Drainage Phasing Plan. This should provide information to the EA, the LLFA and the LPA regarding the proposed management approach during the construction phase to address surface water management during storm events.

- That Warwick District Council consider requiring developers to contribute to community flood defences both within and outside of their red line boundary in these catchments to provide wider benefits and help offset the cumulative impact of development.