

## 1 Appendix E – Cumulative Impact methodology

### 1.1 Methodology

#### 1.1.1 Historic flood risk

Historic flood risk was determined using Worcestershire County Council’s SWMP floodspot data. Each floodspot 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).

Attribute data for each SWMP floodspot includes:

- Number of impacted properties
- Number of impacted businesses
- Number of impacted pieces of critical infrastructure

The total number of properties, businesses and critical infrastructure that are known to have flooded in each catchment was calculated to determine the historic flood risk of the catchments.

#### 1.1.2 Predicted flood risk

Predicted flood risk was assessed by determining the percentage of properties at risk of flooding as a result of increased runoff upstream.

The Local Land and Property Gazetteer (LLPG) database of postcode points was intersected with OS MasterMap data to give the outlines of properties in South Worcestershire.

This data was intersected with the 1000-year and 100-year surface water flood extents separately to determine the number of properties in each catchment, in each surface water flood extent.

The difference between the two was then taken as a percentage of the number of properties in the 100-year surface water flood extent, e.g. if 250 properties are in the 100-year surface water flood extent, and 500 properties are in the 1000-year surface water extent, this would be a 100% increase in properties at risk of flooding due to an increase in flood risk upstream.

#### 1.1.3 Ranking the results

The results for each assessment were ranked into high, medium and low risk as shown in Table E-1 below.

**Table E-1: Ranking the results**

Flood risk ranking	% total properties within catchment at risk of flooding as a result of increased runoff upstream	Total number of properties, businesses and critical infrastructure in LLFA SWMP historic floodspots
Low risk	<250%	<25
Medium risk	250 to 350%	25 to 50
High Risk	>350%	>50

The ranking results were combined from both assessments to give an overall high, medium and low combined ranking for all catchments within South Worcestershire as shown in Table E-2. Specific policies are provided for each risk category.

**Table E-2: Final combined rankings**

Predicted flood risk ranking	Historic flood risk ranking			
		High	Medium	Low
High		High	High	Medium
Medium		High	Medium	Low
Low		Medium	Low	Low

#### 1.1.4 Additional considerations

Some additional factors from local knowledge were considered when finalising overall rankings of the catchments.

##### Rapid response catchments:

The Environment Agency have identified three rapid response catchments in South Worcestershire: the Dick Brook, Badsey Brook and Merry Brook. These are defined as areas that include rivers or streams (including smaller tributaries and ordinary watercourses) where flooding can occur without a significant period of warning time. These three catchments were therefore considered as high-risk catchments, regardless of the results of the other assessments.

##### Skewed results:

Due to the nature of the assessment, catchments with a very small number of postcode points within the surface water extents, could see skewed results, e.g. the Sapey Brook, which has 1 property within the 100-year surface water flood extent and 17 within the 1000-year surface water flood extent. This gave a result of 1600% of properties at risk from increased runoff upstream. This meant that this catchment had an overall ranking of medium, however the catchment is largely outside of the study area.

Incidences of this mainly occurred where only a small area of the catchment lies within South Worcestershire and therefore the effect on the study area is minimal.

For this reason, the Cradley Brook, Sapey Brook and Glynch Brook catchments which all ranked as medium risk overall, were given a final ranking of low.

##### High risk catchments on main rivers:

Several catchments were ranked as medium or high risk and were located along the River Teme, River Severn and River Avon. Any small-scale developments draining into these watercourses are unlikely to have a significant impact on flows on these rivers due to the relative size of the catchment draining in from upstream. For this reason, the River Teme, River Avon and River Severn catchments that were ranked as medium or high risk were given a final ranking of low.

##### Catchments with known flood risk issues:

The Barbourne Brook is an urban catchment known for having drainage issues and is at high flood risk. Therefore, for this assessment the Barbourne Brook been given a final ranking of high.

##### Growth in neighbouring authorities:

Development in neighbouring authorities can affect flood risk in South Worcestershire, especially if the catchment is draining towards the study area. GIS shapefiles were provided by five out the eight neighbouring authorities and these were assessed to determine if any neighbouring development would affect flood risk in South Worcestershire.

There is no significant development in neighbouring authorities on catchments draining into South Worcestershire, other than development in Wyre Forest District, however

development here will drain into the River Severn or River Stour (which drains into the River Severn), and (as explained above) development is unlikely to have an effect on flows on such large rivers.

### 1.1.5 Assumptions

The assumptions made when conducting the cumulative impact assessment is shown in Table E-3.

**Table E-3: Assumptions of the cumulative impact assessment**

Assessment aspect	Assumption made	Details of limitation in method	Justification of method used
Predicted flood risk from increased runoff upstream	Location of properties	Assumption that all properties have been included in the in the OS MasterMap/LLPG data. It may not include all new build properties.	This was the most up to date and accurate data available.
Historic flood risk – LLFA SWMP floodspot data	Severity of historic flooding	Each floodspot 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). The severity of the historic flooding event relating to the floodspot has not been considered, just the total number of properties/businesses/critical infrastructure where there has been a historic flood event.	This is a conservative approach to consider the 'worst case' of flood risk.

The results of the assessment and policy recommendations can be found Chapter 7 and Chapter 10 of the main SFRA report respectively.