Appendix F - Cumulative Impact Assessment

1 Background

1.1 Introduction

The cumulative impact of development should be considered at both the Local Plan making stage and the planning application and development design stages. Paragraph 166 of the National Planning Policy Framework (NPPF, 2023) states:

'Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.'

Appropriate mitigation measures should be undertaken to prevent exacerbation of flood risk, and where possible the development should be used to reduce existing flood risk issues, both onsite and downstream of the development.

To understand the impact of future development on flood risk in Uttlesford District, catchments were identified where development may have the greatest potential effect on flood risk, and where further assessment would be required within a Level 2 SFRA or site-specific Flood Risk Assessment (FRA). To identify the catchments at greatest risk, various factors were considered, including the potential change in developed area within each catchment and communities sensitive to increased risk of surface water and fluvial flooding, alongside evidence of historic flooding incidents. Where catchments have been identified as sensitive to the cumulative impact of development, the assessment sets out planning policy recommendations to help manage the risk.

1.2 Assessment of Cross-Boundary Issues

Figure 1-1 shows the local authority areas which border Uttlesford District.

The topographic characteristics of the district are dictated by chalk hills that rise in the north-west, creating the watershed between three separate river catchments. Valleys of the River Cam (or Granta) run north into Cambridgeshire, the Rivers Chelmer and Pant flow south-east, and the River Roding and River Stort flow south into the Thames River basin. Stansted Brook and Pincey Brook are tributaries of the River Stort. Section 1.5 of the Main Report provides further details on the study area.

Overall flow direction means that the neighbouring authorities of Braintree, Chelmsford, East Hertfordshire, Epping Forest, and South Cambridgeshire have the

potential to be affected in terms of flood risk by Uttlesford District. Therefore, future development both within and outside Uttlesford District could have the potential to affect flood risk to existing communities and surrounding areas, depending on the effectiveness of SuDS and drainage implementation.

Table 1-1 summarises which catchments drain out of Uttlesford District, where the impact of flood risk downstream should be assessed when considering development.

Table 1-1: Summary of catchments that drain into the neighbouring Local Authorities from Uttlesford District.

Catchment	Neighbouring downstream authority
U/S Newport (River Cam)	South Cambridgeshire
Newport to Audley End (River Cam)	South Cambridgeshire
Audley End to Stapleford (River Cam)	South Cambridgeshire
Slade (Tributary of River Cam)	South Cambridgeshire
Wendon Brook (Tributary of River Cam)	South Cambridgeshire
Wicken Water (Tributary of River Cam)	South Cambridgeshire
Debden Water (Tributary of River Cam)	South Cambridgeshire
Granta (Tributary of River Cam)	South Cambridgeshire
Unnamed Watercourse (Tributary of River Cam)	South Cambridgeshire
Hoffer Brook	South Cambridgeshire
Bumpstead Brook	Braintree
River Pant	Braintree
Toppesfield Brook	Braintree
Brain	Braintree
River Ter	Braintree / Chelmsford
U/S Gt Easton (River Chelmer)	Chelmsford
Gt Easton – River Can (River Chelmer)	Chelmsford
Stebbing Brook (Tributary of River Chelmer)	Chelmsford
River Can	Chelmsford
Roxwell Brook	Chelmsford
Upper Roding (to Cripsey Brook)	Epping Forest
Pincey Brook	Epping Forest
Higher Laver Brook	Epping Forest
Stort and Navigation, B Stortford to Harlow	Epping Forest / East Hertfordshire
Little Hallingbury Brook	East Hertfordshire
Stanstead Brook	East Hertfordshire
Stort (at Clavering)	East Hertfordshire
Stort and Bourne Brook	East Hertfordshire
Ash (from Meesden to confluence with Bury Green Brook)	East Hertfordshire
Great Hallingbury Brook	East Hertfordshire

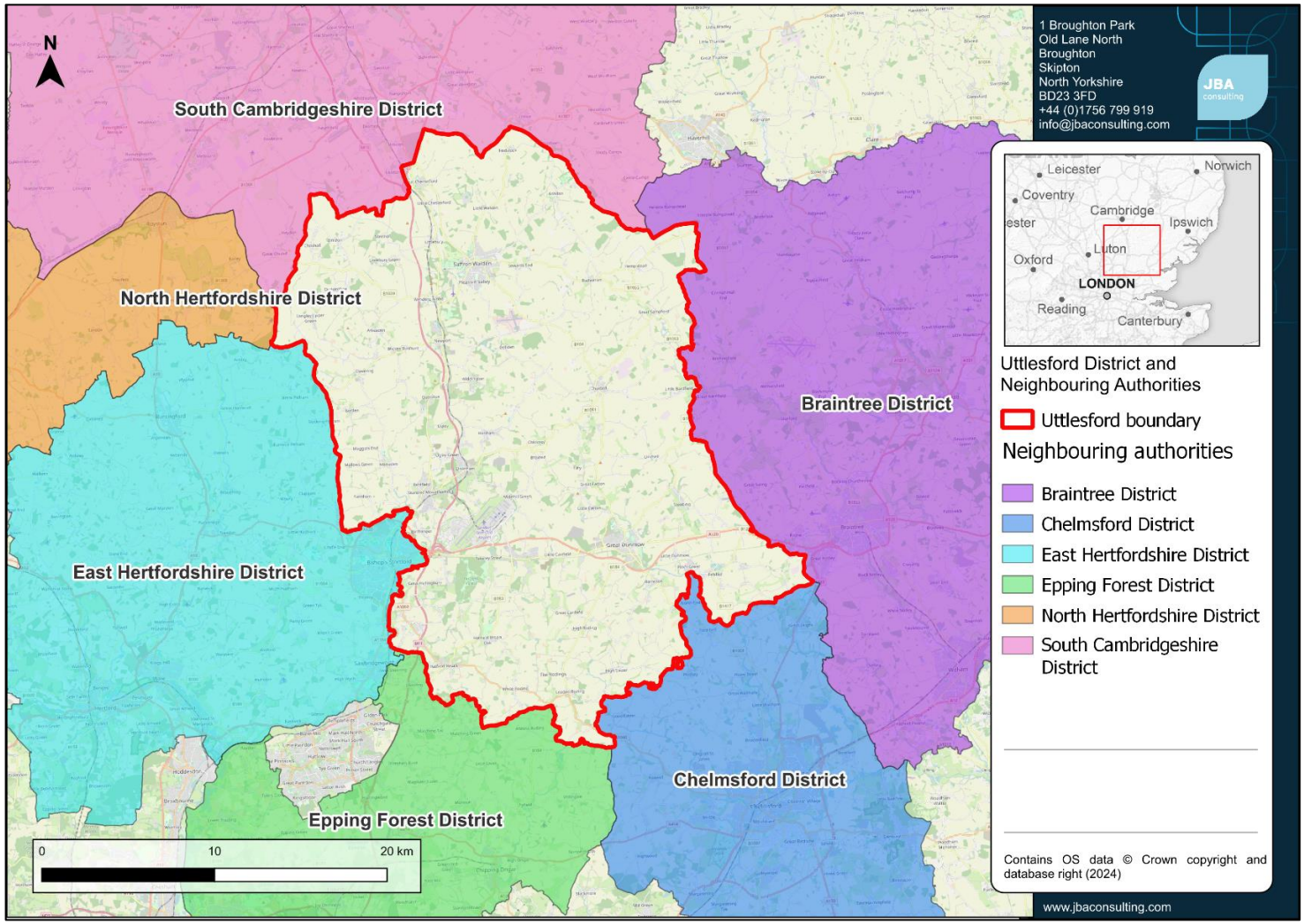


Figure 1-1: Neighbouring authorities to Uttlesford District

1.3 Cumulative Impact Assessment Methodology

For the Cumulative Impact Assessment (CIA), Uttlesford District was assessed at a catchment level using the Water Framework Directive (WFD) catchments, with these catchments shown in Figure 1-2. There are a total of 30 WFD catchments which fall within the district to some extent; however, six of these have less than 5% of their area within the district and have therefore been removed from the assessment. These six catchments all drain out of Uttlesford into neighbouring authority areas and are not areas with proposed allocations within Uttlesford. The six catchments are listed below:

- Toppesfield Brook
- Roxwell Brook
- Higher Laver Brook
- Brain
- Hoffer Brook
- Ash (from Meesden to confluence with Bury Green Brook)

There are four stages to the Level 1 CIA:

1. Assess sensitivity to fluvial and surface water flood risk.
    - This will be assessed by calculating the change in the building area shown to flood from the 1% AEP to the 0.1% AEP events for fluvial and surface water flooding respectively, given as a percentage of the total building area in the catchment.
2. Identify historic flooding incidents.
    - Identify the total number of historic flooding incidents within each catchment.
3. Assess the catchments with the highest degree of proposed new development.
    - This will be assessed by calculating the percentage area of each catchment covered by proposed development.
4. Identify the catchments at greatest risk.
    - Rank catchments in each category.
    - Discussion of catchments which are at high risk in all categories/individual categories.
    - Policy recommendations for developments in higher risk catchments.
    - Identify catchments needing further consideration within a Level 2 SFRA (if required).

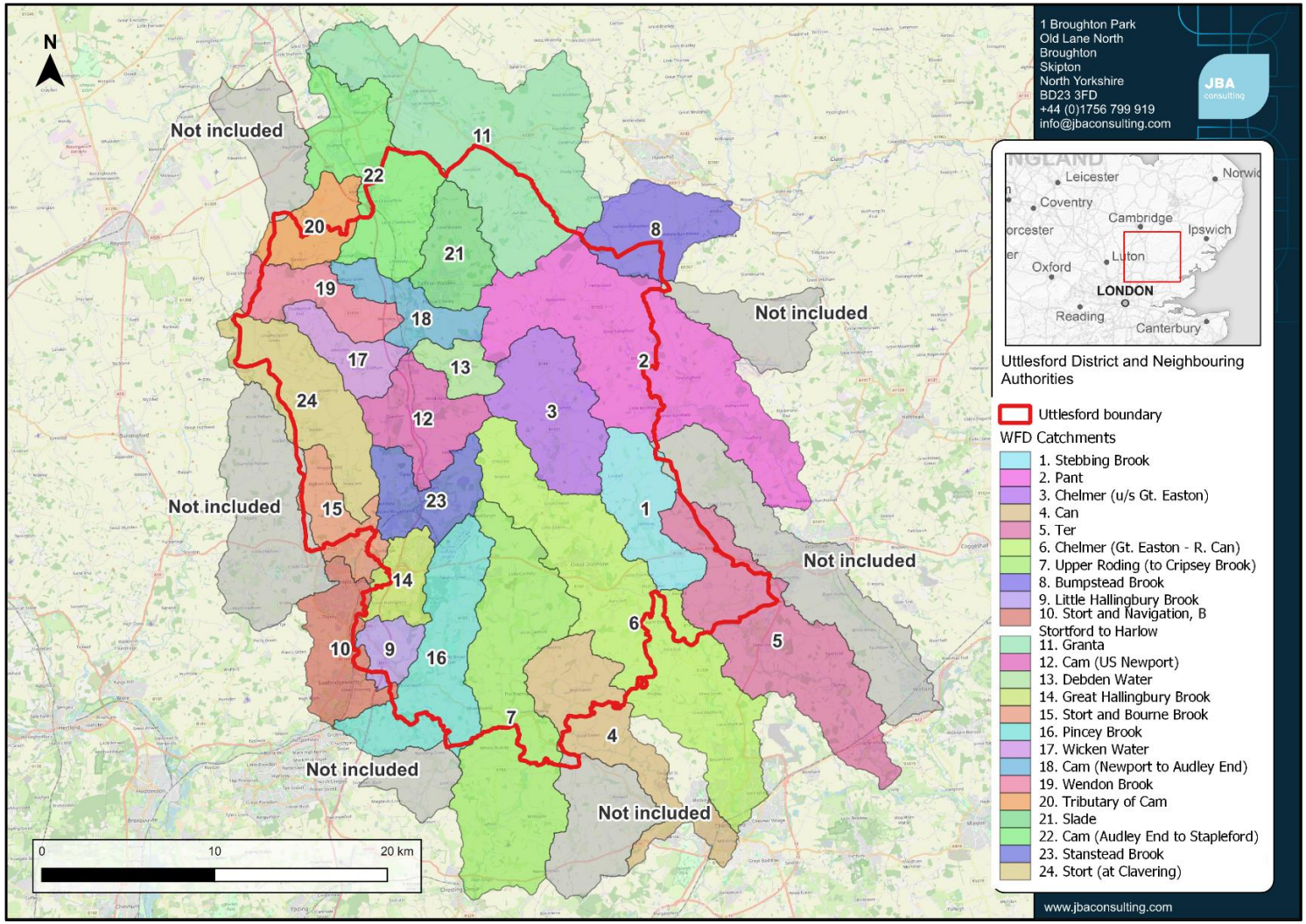


Figure 1-2: Catchments within Uttlesford District

Catchments within the study area were ranked on four metrics: sensitivity to increased fluvial flood risk, sensitivity to increased risk of surface water flooding, prevalence of recorded historic flood incidents (limited by the data available), and area of new development proposed within the catchment.

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

Table 1-2: Summary of datasets used within the Broadscale CIA.

Dataset	Coverage	Source of data	Use of data
Catchment Boundaries	Uttlesford District and neighbouring authorities	Water Framework Directive Catchments	Assessment of susceptibility to cumulative impacts of development by catchment
OS Open Zoomstack Local Buildings	Uttlesford District and neighbouring authorities	Ordnance Survey	Built area for the assessment of flood risk
Risk of Surface Water Flooding Mapping	Uttlesford District and neighbouring authorities	Environment Agency	Assessing the building area at risk of surface water flooding within each catchment
Fluvial Flood Zones 2 and 3a	Uttlesford District and neighbouring authorities	EA Flood Map for Planning	Assessing the building area at risk of fluvial flooding within each catchment
Future development areas	Uttlesford District, South Cambridgeshire District and Chelmsford District	Uttlesford District Council, South Cambridgeshire District and Chelmsford District	Assessing the impact of proposed future development on risk of flooding
Historic Flooding Incidents	Uttlesford District, Braintree District, Chelmsford District and Epping Forest District	Essex County Council, Uttlesford District Council	Assessing incidences of historic flooding

1.3.1 Sensitivity to increases in fluvial flooding

This is the measure of the increase in the area of buildings at risk of fluvial flooding from the 1% AEP event to the 0.1% AEP 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.

The OS Open Zoomstack Local Buildings layer was used to identify all buildings within the catchments as this is an open data source which provides full coverage of the district and cross boundary catchments.

The buildings layer was intersected with the 1% and 0.1% AEP fluvial flood extents separately to determine the area of buildings flooded in each catchment, in each flood extent. The difference between the two values was then taken as a percentage of the total building area within the catchment to allow comparison between catchments of different sizes.

The fluvial flood risk is shown to be generally low across the district. Catchments with greater than 3% of the building area at increased risk were considered to be highly sensitive.

1.3.2 Sensitivity to increases in surface water flooding

This is the measure of the increase in the area of buildings at risk of surface water flooding in a 1% AEP event to a 0.1% AEP event and follows the same process as for fluvial flood risk, see Section 1.4.1 above.

Catchments with greater than 5% of the building area at increased risk were considered to be highly sensitive.

1.3.3 Growth in the area

Development within Uttlesford District 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 Uttlesford District Council. The area of 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.

Data was received from South Cambridgeshire District and Chelmsford District for development sites surrounding Uttlesford District, and were assessed as part of this CIA. It should be noted that data was not received from other neighbouring authorities. However, the risk from neighbouring districts' development proposals is negligible as no watercourses flow into Uttlesford District.

Catchments with more than 4% of their area earmarked for development were considered high risk.

1.3.4 Historic flood risk

Recorded flooding event data was provided by Essex County Council for Uttlesford District for this assessment. This dataset also covers the neighbouring districts of Braintree, Chelmsford and Epping Forest. No historic flooding data was made available for the other neighbouring authorities. Therefore, historic events in catchments that cross these local authorities' boundaries are unknown.

Details of historic flood events can be found in Section 4.1 of the Main Report. The historic data was represented as point data, where 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 within the catchments. Where historic flooding data was not available for over 50% of the catchment area, the historic assessment result was not included in calculating the overall ranking for the catchment. The historic assessment was therefore excluded from the following catchments:

- Granta
- Tributary of Cam

Catchments with 50 or more recorded flooding incidents were considered high risk.

1.3.5 Ranking the results

The results for each assessment were ranked into high, medium, and low risk as shown in Table 1-3. Ranking delineations were given at natural breaks in the results.

The ranking results were combined from all four assessments (except for the historic assessment for some catchments as discussed in Section 1.4.4) to give an overall high, medium, and low ranking for all catchments within Uttlesford District. Each catchment was assigned a score for each assessment based on its ranking (high = 3, medium = 2, low = 1) and these were then averaged to produce a final score and ranking. Any catchment producing an overall score of 2 or greater was considered high risk.

There is currently no national guidance available for assessing the cumulative impacts of development. These rankings provide a relative assessment of the catchments within Uttlesford and are not comparable across other boroughs/districts. The thresholds used have been based on natural breaks in the data and professional judgement.

Table 1-3: Ranking assessment criteria

Flood risk ranking	Percentage of increased building area at risk of fluvial flooding	Percentage of increased building area at risk of surface water flooding	Total number of historic flooding incidents	Percentage area of catchment covered by new development
Low risk	<1	<3	<30	0
Medium risk	1 to 3	3 to 5	30 to 50	1 to 4
High risk	>3	>5	>50	>4

1.3.6 Assumptions

The assumptions made when conducting the CIA are shown in Table 1-4.

- Policy recommendations with regards to managing the cumulative impact of development have been made in Section 2 below. This will help to ensure there is no incremental increase in flood risk both within and downstream of Uttlesford District.

Table 1-4: Assumptions of the CIA

Assessment aspect	Assumption made	Details of limitation in method	Justification of method used
Surface water flood risk; Flood Zone 2 and 3a	Total building area	Assumption that all buildings have been included in the OS Open Zoomstack Local Buildings dataset. It may not include all new buildings. It also does not include all buildings across some of the larger cross-boundary catchments.	This was the most up to date and accurate data available.
Fluvial flood risk	Climate change proxy	Used the Flood Map for Planning Flood Zone 2 as an indicative estimate of the impacts of climate change across the district.	Although detailed climate change modelling was available for some watercourses, the broader Flood Map for Planning covers the entire area of the catchments both within and outside the district and therefore provided a consistent approach for this high level assessment.
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 were used. 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.	GIS data sourced provided the most accurate results possible for the location of historic flooding incidents across the district.

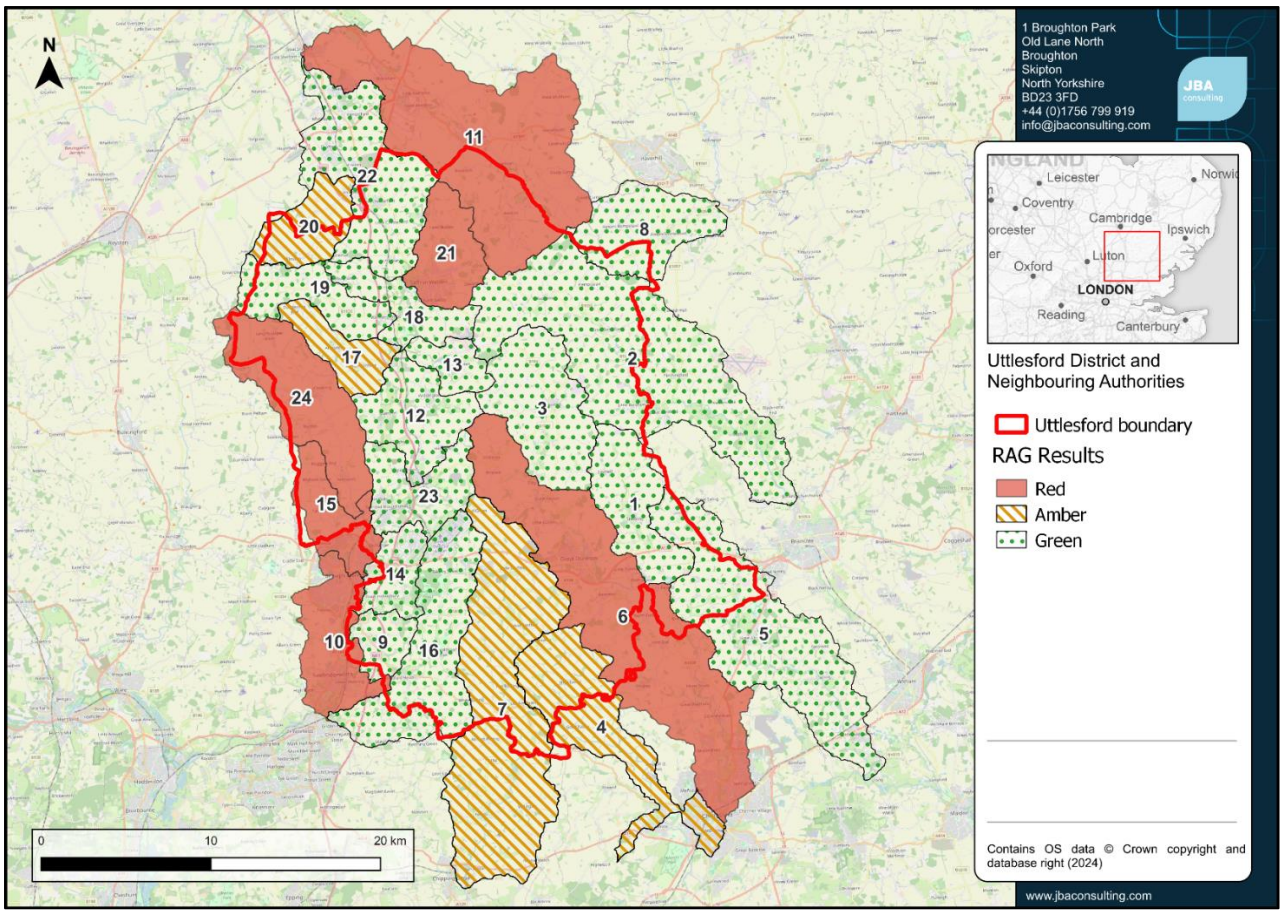
Assessment aspect	Assumption made	Details of limitation in method	Justification of method used
Historic Flooding incidents	Coverage	Historic data provided by Essex County Council only covered Uttlesford, and the following neighbouring authorities: Braintree, Chelmsford and Epping Forest. Therefore, this does not provide data across some of the other cross-boundary catchments.	Best available historic data has been used. To reduce any impacts of the limited data coverage, for catchments where greater than 50% of their area lies outside the District, and where historic flooding data was not available for the neighbouring authorities, the historic assessment was not included within the overall ranking as the count is likely to be a considerable underestimate for these catchments.
Development	Area of development	Assumed that the whole site area will be developed.	Information on site layout not available at this time so this assumes a worst-case scenario.

1.4 Overall rankings

For each assessment, catchments were given a score of 3 (high), 2 (medium), or 1 (low) risk, excluding the historic data assessment where sufficient information was not available. These scores were then averaged across the assessment to give a combined score.

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. The RAG ratings are shown in **Error! Reference source not found.**. The catchments with an average score of greater than or equal to 2 were deemed high risk.

Figure 1-3: Results of the RAG assessment for Uttlesford District



2 Level 1 SFRA Policy recommendations

2.1 Broadscale recommendations

All developments are required to comply with the NPPF and demonstrate they will not increase flood risk elsewhere. Therefore, providing developments comply with the latest guidance and legislation relating to flood risk and sustainable drainage, and appropriate consideration is given to surface water flow paths and storage proposals should normally not increase flood risk downstream.

The high-level CIA for Uttlesford District has highlighted areas where there is the potential for development to have a cumulative impact on flood risk. Catchments have been identified as high, medium, or low risk, relative to the other catchments within the district.

Flood risk can be affected by several different factors, which have been assessed as part of the CIA. As a result, incremental action and betterment in flood risk terms across the whole district should be supported where possible.

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

- Uttlesford District Council should work closely with neighbouring local authorities to develop complementary Local Planning Policies for catchments that drain into and out of the area to other local authorities in order to minimise any 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 where practicable. Developers should refer to the relevant Lead Local Flood Authority (LLFA) guidance for the requirements for SuDS in Uttlesford District. Further guidance on SuDS can be found in Section 9 of the Main Report.
- Essex County Council as LLFA will review Surface Water Drainage Strategies in accordance with their local requirements for major and non-major developments. These should consider all sources of flooding to ensure that future development is resilient to flood risk and does not increase flood risk elsewhere.
- Where appropriate, the opportunity for NFM in rural areas, SuDS retrofit in urban areas and river restoration should be maximised. Culverting should not be supported, and day-lighting existing culverts should be promoted through new developments.

- Runoff rates from all development sites must be limited to greenfield rates (including brownfield 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, not exceeding brownfield rates.
- Where required, site-specific FRAs should explore opportunities to provide wider community flood risk benefits 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 by the provision of additional storage on site e.g. through oversized SuDS, NFM techniques, green infrastructure, and green-blue corridors, and/ or by providing a Partnership Funding contribution towards any flood alleviation schemes.
- Uttlesford District Council should consider requiring developers to contribute to community flood defences outside of their red line boundary to provide wider benefits and help offset the cumulative impact of development.

Section 8 of the Main Report details the local requirements for mitigation measures. Catchment-specific recommendations are made for high and medium risk catchments below.

If any future windfall sites are proposed within these catchments, then developers should consider the recommendations set out below so that existing flooding issues in the catchment are not exacerbated by any future development and options for betterment are considered.

2.2 Recommendations for high-risk catchments

High risk catchments are shown in **Error! Reference source not found.**. From analysing the results produced above, high-level recommendations for flood storage and betterment have been proposed for sites in each of the high-risk catchments. These recommendations should be considered by developers as part of a site-specific assessment, but 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. The FRA should consider the potential cumulative effects of all proposed development and how this affects sensitive receptors.

The following recommendations are made for high risk catchments:

- Developers should 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 Local Planning Authority (LPA) regarding the proposed approach to surface water management in storm events during the construction phase.
- The LLFA and LPA should consult with Local Not-For-Profit organisations such as wildlife trusts, rivers trusts, and catchment partnerships. This will help 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.

- The LPA 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 NFM features. Investigations should seek to determine where developments have the potential to contribute towards works to reduce flood risk and enable regeneration in catchments as well as contributing to the wider provision of green infrastructure.

This is applicable to the following catchments:

- Chelmer (Gt. Easton - R. Can)
- Stort and Navigation, B Stortford to Harlow
- Granta
- Stort and Bourne Brook
- Slade
- Stort (at Clavering)

2.3 Development within medium risk catchments

Catchments that have scored an overall ranking of medium, but where development is proposed should also consider the following recommendations:

- LPAs 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 NFM features.
- There is the potential for development in these catchments to contribute towards works to reduce flood risk and enable regeneration as well as contributing to the wider provision of green infrastructure.

This is applicable to the following catchments:

- Can
- Upper Roding (to Cripsey Brook)
- Wicken Water
- Tributary of Cam