Appendix C - 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 171 of the National Planning Policy Framework (NPPF, 2024) 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.'

When allocating land for development, consideration should be given to the potential cumulative impact of the loss of floodplain storage volume. Whilst the loss of storage for individual developments may only have minimal impact on flood risk, the cumulative effect of multiple developments may be more severe. There are also risks of development causing modified flow regimes from sites creating an alignment in peak flows in downstream watercourses and resulting in greater flood risk as a result of the development.

Conditions imposed by Derby City Council should allow for mitigation measures so any increase in runoff as a result of development is properly managed and should not exacerbate flood risk issues, either within, or outside of the Councils' administrative area.

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 undertaken to ensure 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 Derby City, 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 Strategic Flood Risk Assessment (SFRA) or site-specific Flood Risk Assessment (FRA). To identify the catchments at greatest risk, various factors were considered, including communities sensitive to increased fluvial and surface water flood risk, and records of historic flooding. 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.

2. Assessment of cross-boundary issues

Derby City is located in Derbyshire, England and is bordered by Amber Valley Borough to the northwest, Erewash Borough to the northeast and east, and South Derbyshire District to the west, south, and southeast.

Most of the city lies with the Derwent Derbyshire catchment. The southwestern side of the city lies within the Lower Trent and Erewash catchment. The highest elevations are along the northeastern and northwestern boundaries of the city and in the western side of the city. The lowest elevations are through the centre, and west of the city along the path of the River Derwent which flows in a south-easterly direction through the city. There are also lower elevations in the south of the city around Cattle Brook.

The majority of the city is drained by several smaller watercourses which feed into the River Derwent. The River Derwent rises at Swains Greave to the east of Glossop in High Peak District and then flows in a southerly direction through mainly rural areas of Derbyshire Dales District and Amber Valley Borough, flowing along the boundary between Amber Valley Borough and Erewash Borough for a short distance before it enters Derby City to the north. Once it leaves Derby City, the River Derwent continues in a south-easterly direction along the border between Erewash Borough and South Derbyshire District before it joins the River Trent.

A small area of the south and southwest of the city is drain by a number of tributaries of the River Trent, which flow south and enter the River Trent in South Derbyshire District, upstream of the confluence of the River Trent and River Derwent.

The neighbouring authorities and the main rivers are shown in Figure 2-1.

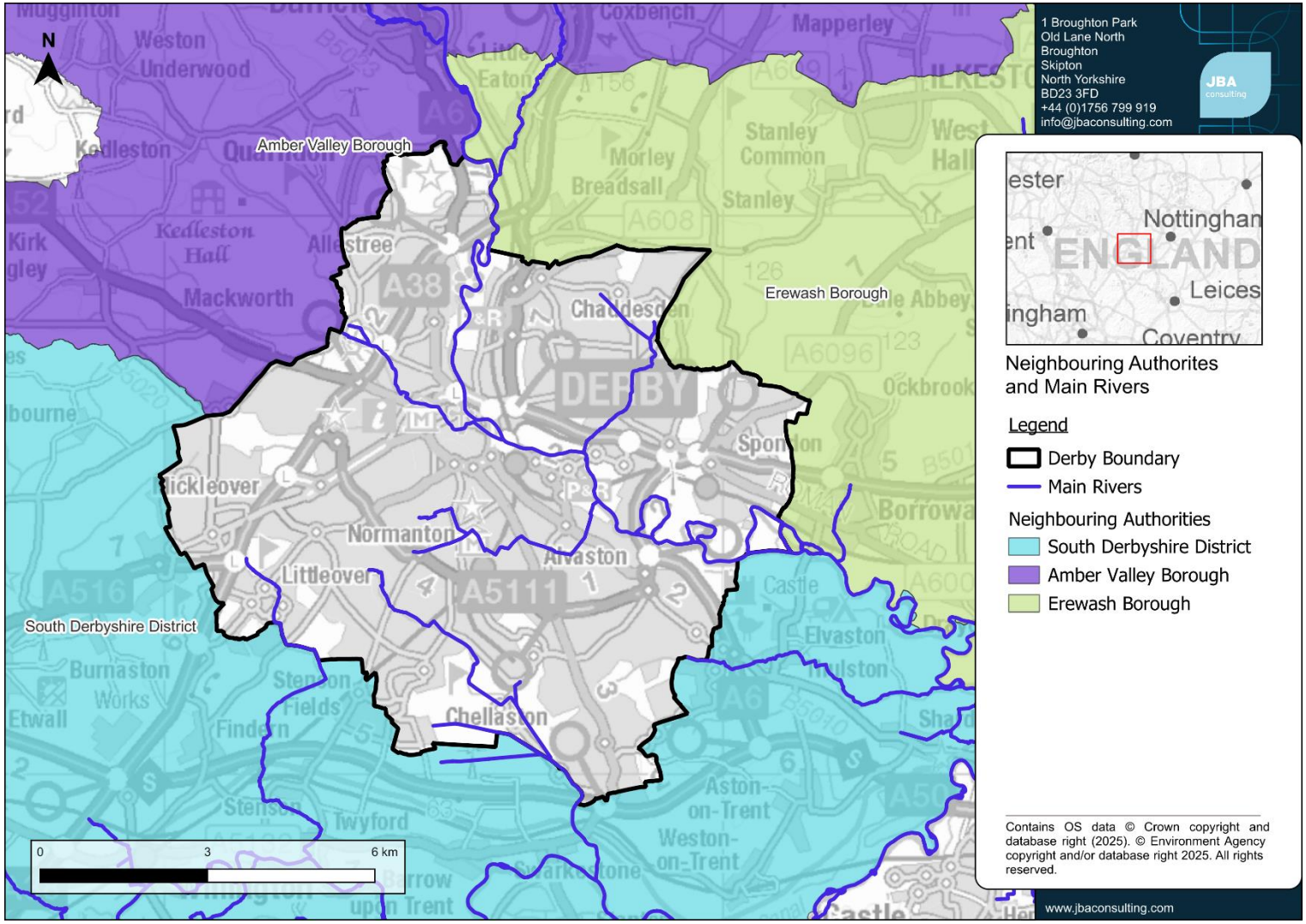


Figure 2-1: Neighbouring authorities and main rivers.

3. Cumulative Impact Assessment

3.1 Methodology

For the Cumulative Impact Assessment (CIA), Derby City was assessed at a catchment level, shown in Figure 3-1. The Water Framework Directive (WFD) catchments were used as a starting point and the following amendments were made:

- The 'Derwent from Bottle Brook to Trent' catchment was removed and the catchment along the Derwent within Derby City was divided into three areas as surface water risk is the key consideration in these areas:
  - Derwent – Derby City (East)
  - Derwent – Derby City (South)
  - Derwent – Derby City (North)
- The 'River Trent from River Dove Confluence to River Derwent' catchment was removed as less than 1% of the catchment lies within Derby City, and it drains out of the city.

Table 3-1 summarises the datasets used within the Derby City CIA.

Table 3-1: Summary of datasets used within the broadscale CIA.

Dataset	Coverage	Source of data	Use of data
Water Framework Directive catchments	Derby City and neighbouring authorities	Environment Agency	Defining catchments for use within the assessment
OS Open Zoomstack Local Buildings	Derby City and neighbouring authorities	Ordnance Survey (open source)	Assess the current developed area in each catchment
Risk of Flooding from Surface Water	Derby City and neighbouring authorities	Environment Agency	Assessing the built area at risk of surface water flooding
Flood Zones 2 and 3a	Derby City and neighbouring authorities	Environment Agency	Assessing the built area at risk of fluvial flooding
Historic Flooding Incident Data (surface water, groundwater, and foul drainage incidents)	Derby City only	Derby City Council Severn Trent Water	Assessing the prevalence of historic flooding

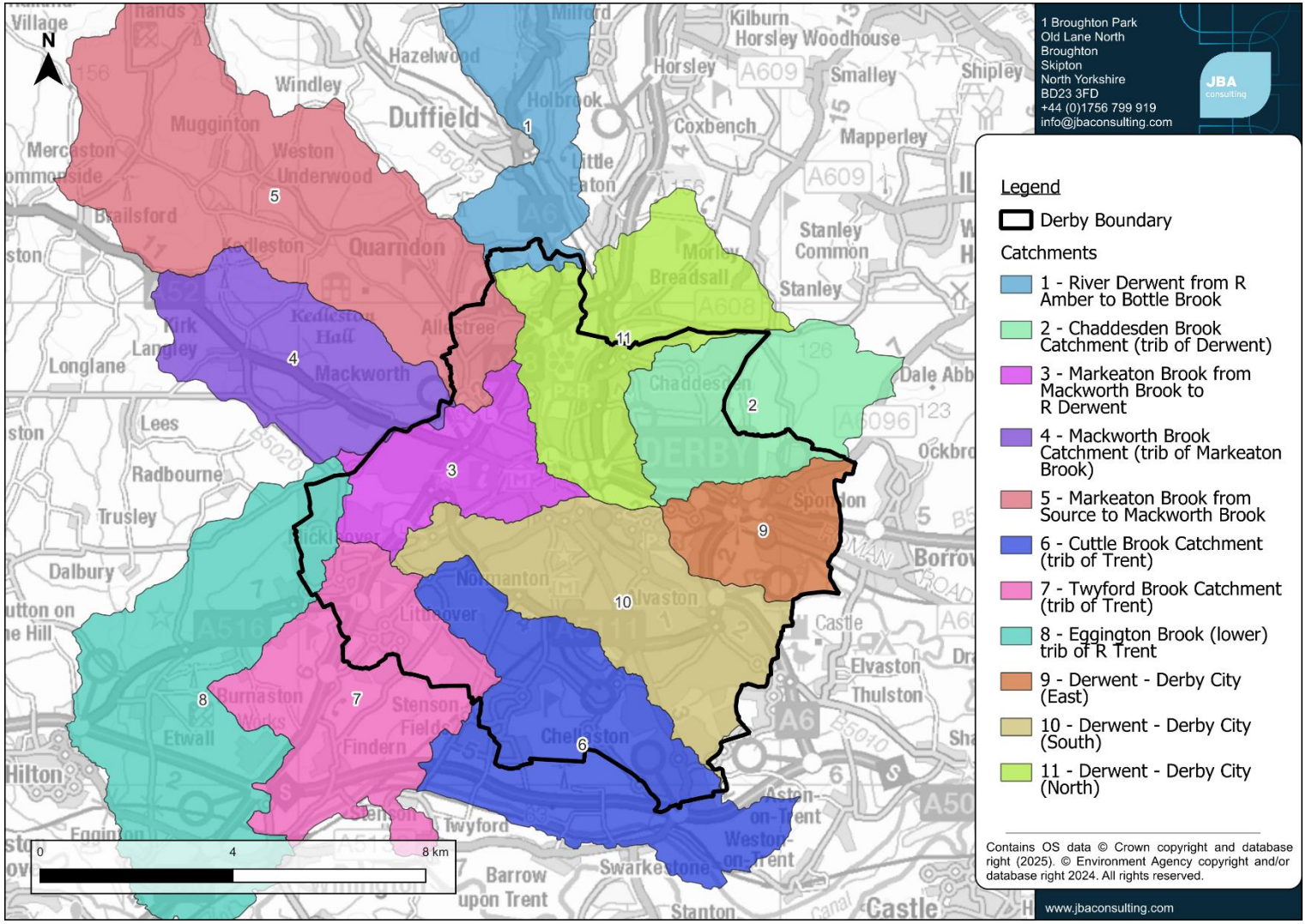


Figure 3-1: WFD catchments across Derby City.

No development data was available for this assessment. Given the urban nature of Derby City, it is likely that most proposed development will be brownfield and is unlikely to significantly increase the developed area of the city. Therefore, this assessment identifies the catchments that are most sensitive to increased flood risk and recommendations are then based on the nature of risk within the catchments.

There are three stages to this Level 1 CIA:

1. Assess sensitivity to increased fluvial flood risk.

It is important to understand which catchments are most sensitive to increases in flood flows which may theoretically be caused by new development. Predicted flood risk was assessed using the following datasets:

- Total area of buildings within Flood Zone 3a for each catchment.
- Total area of buildings within Flood Zone 2 for each catchment.

The difference in the area of buildings at risk in these two datasets has then been used as an indicator to identify which catchments are more sensitive to increases in fluvial flood flows.

2. Assess sensitivity to increased surface water flood risk.

It is important to understand which catchments are most sensitive to increases in flood flows which may theoretically be caused by new development. Predicted flood risk was assessed using the following datasets:

- Total area of buildings within the 1% AEP surface water flooding extent for each catchment.
- Total area of buildings within the 0.1% AEP surface water flooding extent for each catchment.

The difference in the area of buildings at risk in these two datasets has then been used as an indicator to identify which catchments are more sensitive to increases in surface water risk.

3. Identify historic flood risk.

A historic flood risk score was derived for each catchment using the number of historic flooding incidents within each catchment, based on data provided by Derby City Council and Severn Trent Water.

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.

The data provided does not cover the neighbouring authority areas. To reduce any impacts of the limited data coverage, for catchments where greater than 50% of their area lies outside the district including considerable urbanised areas, this part of the historic assessment was not included within the overall ranking as the count is likely to be a considerable underestimate for these catchments.

3.2 Ranking of catchments

The results for each assessment were ranked into high, medium, and low susceptibility to increased risk as shown in Table 3-2. The ranking results were combined from the three assessments to give an overall high, medium, and low ranking for all catchments within the city. 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.

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

Table 3-2: Ranking assessment criteria

Flood risk ranking	Percentage area of properties at increased flood risk	Percentage area of properties at increased surface water risk	Total number of historic flooding incidents
Low risk	<=3	<=10	<=100
Medium risk	<=10, >3	<=20, >10	<=200, >100
High risk	>10	>20	>200

3.3 Overall rankings

A Red-Amber-Green (RAG) rating was applied to the catchments, with red being high, amber being medium, and green being low sensitivity to increased flood risk. The catchments with an average score of greater than 2 were deemed high risk.

The following catchments are identified as high risk:

- Derwent – Derby City (East)
- Derwent – Derby City (South)
- Derwent – Derby City (North)

The following catchments are identified as medium risk:

- Chaddesden Brook Catchment (trib of Derwent)
- Markeaton Brook from Mackworth Brook to R Derwent
- Cuttle Brook Catchment (trib of Trent)

The results of the RAG assessments are shown in Figure 3-2.

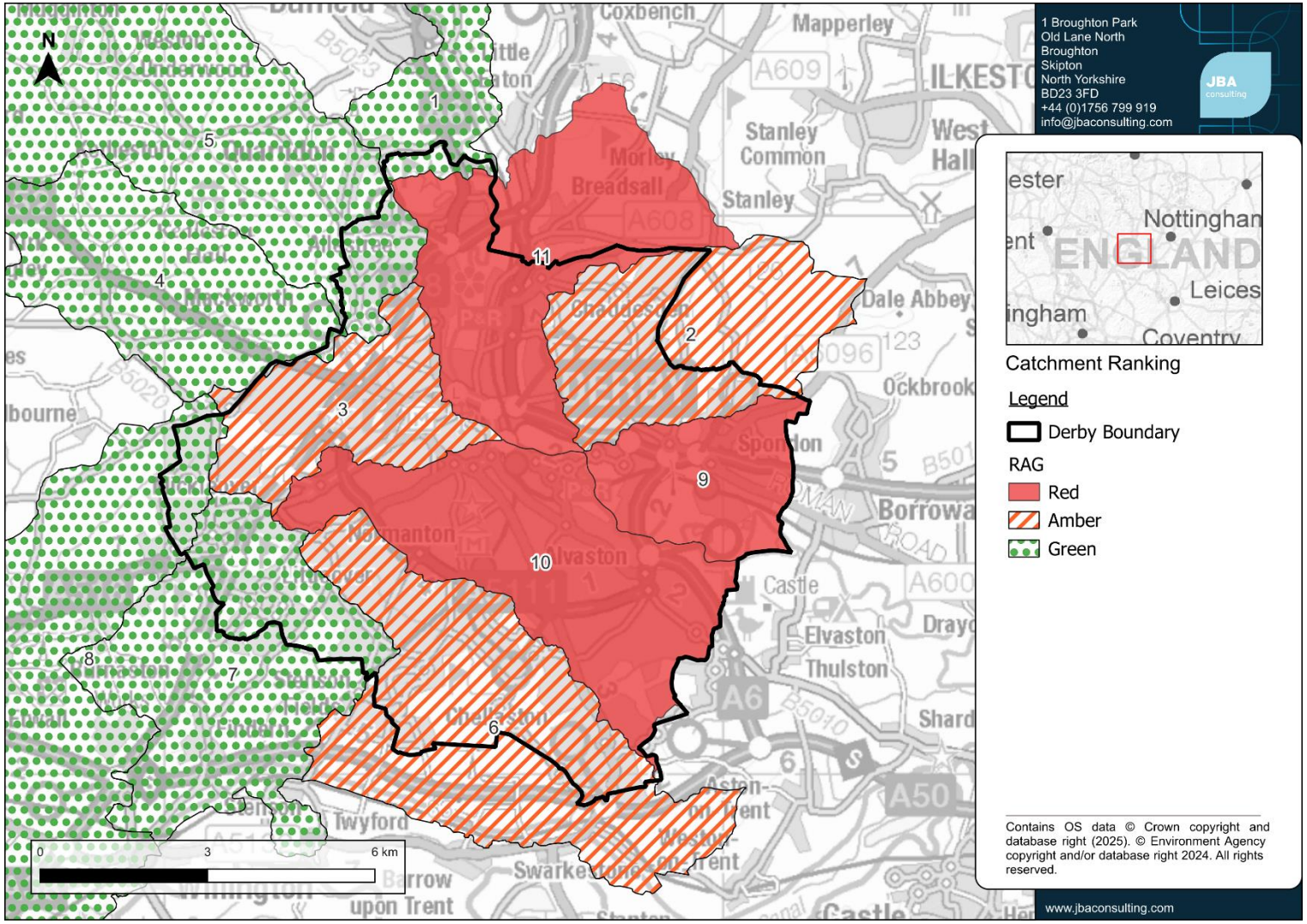


Figure 3-2: Results of the RAG assessment for Derby City.

The catchments identified at high risk are all within Derby City. In this area, the main fluvial risk is from the River Derwent. Given the nature of this fluvial risk, development within these catchments is unlikely to have implications for fluvial risk. Surface water flood risk has the potential to be impacted by development in these areas and is considered more important. Therefore, a separate ranking considering just surface water flood risk is set out within Section 3.4.

Three catchments were identified as medium risk. Chaddesden Brook Catchment (trib of Derwent) ranked as low sensitivity to increased fluvial and surface water risk. However, the catchment is shown to already be at relatively high surface water risk and ranked the highest for the prevalence of historic flooding incidents within the catchment. Markeaton Brook from Mackworth Brook to R Derwent ranked as medium risk across all categories whilst the Cuttle Brook Catchment (trib of Trent) ranked as medium risk for increased surface water flood risk and the prevalence of historic flooding incidents.

3.4 Surface water rankings

As identified in Section 3.3 the characteristics of the authority area means that the key source of flood risk that can potentially be influenced by new development is surface water. Therefore, a RAG rating was applied to the catchments, with red being high, amber being medium, and green being low sensitivity to increased surface water flood risk.

This identified the following catchments as high risk:

- Eggington Brook (lower) trib of R Trent
- Derwent – Derby City (East)

The following catchments are identified as medium risk:

- Markeaton Brook from Mackworth Brook to R Derwent
- Cuttle Brook Catchment (trib of Trent)
- Derwent – Derby City (South)
- Derwent – Derby City (North)

The results of the RAG assessment for surface water are shown in Figure 3-3.

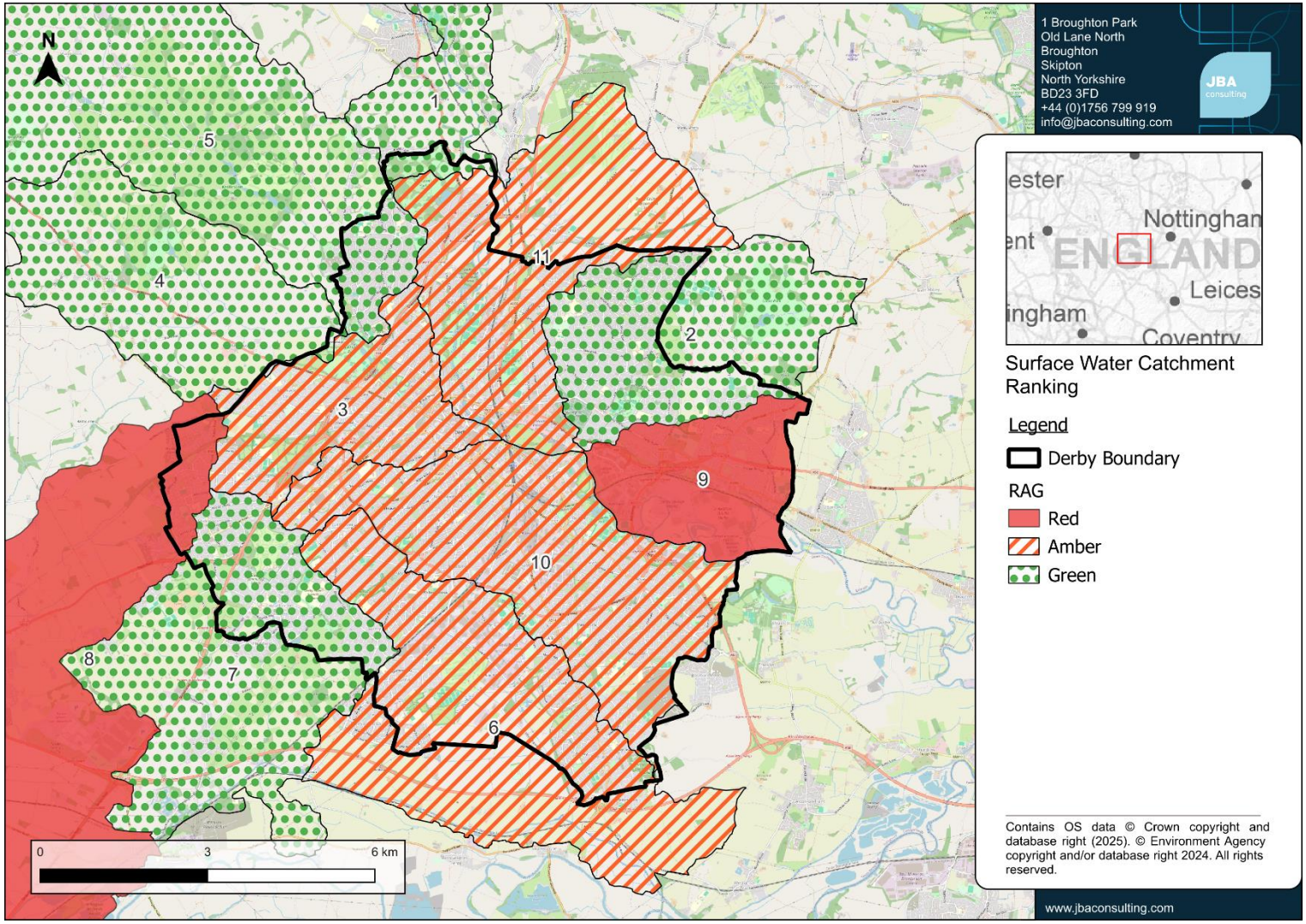


Figure 3-3: Results of the RAG assessment for surface water risk for Derby City.

4. Level 1 SFRA Policy recommendations

4.1 Broadscale recommendations

All developments are required to comply with the 2024 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 Derby City has highlighted areas where there is the potential for development to have a cumulative impact on flood risk. 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 entire city should be supported where possible.

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

- Derby City 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.
- Derby City Council should work closely with neighbouring local authorities and other groups such as River Trusts and Catchment Partnerships to seek opportunities for Natural Flood Management (NFM) in upstream catchments with may reduce the flood risk downstream within Derby City.
- 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 Derby City Council SuDS Guidance (derby.gov.uk) for the requirements for SuDS in Derby City. Further guidance on SuDS can be found in Section 9 of the Main Report.
- Derby City 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.
- The opportunity for SuDS retrofit within the authority area should be maximised given the significant urbanisation and prevalence of historic surface water incidents.
- 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 but not exceeding the existing brownfield runoff rate.

- 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.
- Derby City 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.

Specific recommendations are made for high risk catchments below.

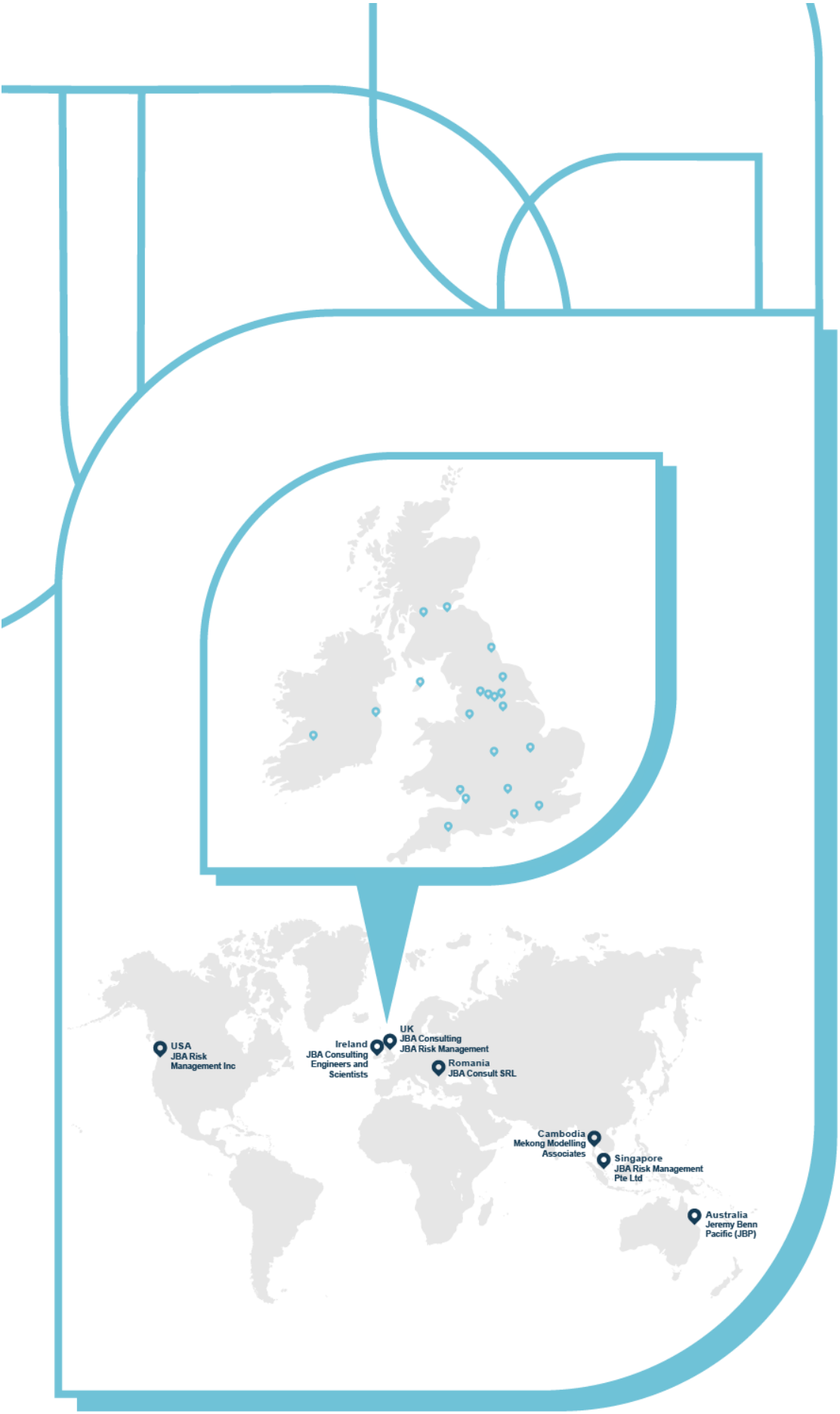
4.2 Recommendations for high and medium risk surface water catchments

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.

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

The following recommendations are made for high and medium risk surface water catchments:

- The LPA should work closely with the neighbouring LPAs of Erewash Borough and South Derbyshire District to manage any cross-boundary implications. Development upstream in Erewash may have implications for flood risk in Derby City, whilst Derby City may have implications for flood risk downstream in South Derbyshire District.
- Use of oversized SuDS should be considered, where viable, to provide betterment beyond the existing greenfield runoff rate.
- Opportunities for retrofitting of SuDS in existing developed areas should be sought to reduce runoff rates from existing developments. This is key with the urban centre of Derby City given the significant urbanisation and prevalence of historic surface water incidents.



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