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 the City of Birmingham 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 the City of Birmingham, 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). 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 were 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

Birmingham City Council has four plans that apply to the Birmingham City area. These are the Birmingham Development Plan (2017), Aston, Newtown and Lozells Area Action Plan (2012), Longbridge Area Action Plan (2009) and Bordesley Park Area Action Plan (2020). Each of these plans set forth a vision 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. Birmingham City Council are currently preparing a new Local Plan for Birmingham for the period up to 2042. The 'Birmingham Plan', once adopted this will replace the Birmingham Development Plan, Aston, Newtown and Lozells Area Action Plans and Longbridge Area Action Plan. The 'Issues and Options' document for the new 'Birmingham Plan' is scheduled to go to consultation in Autumn 2022.

The Local Flood Risk Strategy for Birmingham and Surface Water Management Plan for Birmingham, Humber River Basin Management Plan and River Trent Catchment Management Plan set out specific actions for the authority region.

Section 1.2.1 sets out the strategic plans that exist for the authority region. The list below 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 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 the City of Birmingham, strategic solutions encourage development to:

- Prevent deterioration of the status of surface water and groundwater,
- Aim 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,
- Reverse any significant and sustained upward trends in pollutant concentrations in groundwater,
- End discharges, emissions and losses of priority hazardous substances into surface waters,
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants,
- Reduce risk to people, economic damage and community disruption,
- Use 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,
- Engage with a variety of stakeholders across the region to develop plans and seize opportunities for collaborative partnership working,
- Provide a greater role for communities in managing flood risk,
- Improve knowledge and understanding of flood risk and management responsibilities, and of watercourse networks and drainage infrastructure,
- Reduce the disruption caused by flooding to transport and infrastructure,
- Promote sustainable and appropriate development,
- Deliver flood risk management measures that have social, economic and environmental benefits,
- Identify opportunities to use areas of the floodplain to store water during high flows and reduce long term dependence on engineered flood defences,
- Use SFRAs to inform future development and minimise flood risk from all sources,

- Implement 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
- Promote and consider Sustainable Drainage Systems (SuDS) at the earliest stage of site development.

In some locations, the Environment Agency (EA) have 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 the City of Birmingham

Birmingham City Council is already included within the Birmingham and Black Country Local Nature Partnership (LNP). The following are other stakeholders and project delivery schemes affecting the City.

Tame, Anker and Mease Catchment Based Approach:

The **Tame, Anker and Mease (TAM)** is the associated Catchment Based Approach (CaBA) catchment partnership for the 'Tame, Anker and Mease' catchment hosted by the Trent Rivers Trust. It is a collaboration between relevant partners to deliver projects that will improve the health of the area's rivers and wetland environments.

Their key principles are:

- Engage and work with local stakeholders and communities
- Create a more sustainable and diverse water environment
- Increase the natural capacity of rivers, streams, and wetlands to alleviate the impacts of flooding and pollution
- Enhance the quality of the natural environment for the benefit of people's health and wellbeing

Birmingham and Black Country Nature Improvement Area

In 2012, Birmingham and the Black Country was designated as one of twelve Nature Improvement Areas by the government. Birmingham and Black Country Wildlife Trust lead over 60 partners in delivering the NIA vision of "an urban landscape permeated by a network of high-quality greenspace which is rich in wildlife and enjoyed by the people who live and work here".

The **Birmingham and Black Country Nature Improvement Area Ecological Strategy 2017 - 2022** sets out the key priorities in protecting biodiversity in Birmingham and the Black Country:

- **Protect** Core Ecological Areas through pro-active engagement with the planning of development, advocacy, supporting land-owners to manage land sympathetically and encouraging sustainable land-use.
- **Enhance** Ecological Linking Areas by restoring habitats and improving existing sites.
- **Create** new sites in Ecological Opportunity Areas that together form networks of sites that allow wildlife to move through the most developed parts of the conurbation.

A Wilder Birmingham and Black Country

A Wilder Birmingham and Black Country is a strategy by the Birmingham and Black Country Wildlife Trust to make nature an integral part of people's lives. They aim to achieve this by engaging with all sections of the community and working together to help reverse nature's decline, creating better places to live and improve health and wellbeing. **A Wilder Birmingham and Black Country Our Strategy 2022-2030** sets out the Wildlife Trust's 3 main aims to achieve by 2030.

- 30% of Birmingham and the Black Country's landscape will be managed for the benefit of wildlife
- At least 1 in 4 people across Birmingham and the Black Country will be taking action for nature
- 500 hectares of land will be improved to provide nature-based solutions to the ecological and climate crises

Birmingham and Black Country Wildlife Trust Nature Reserves

Birmingham and Black Country Wildlife Trust manage 3 Nature Reserves within the City of Birmingham. These are:

- Woodgate Valley
- Hill Hook Local Nature Reserve
- Moseley Bog

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

- Woodland
- Wet Woodland
- Marshland
- Meadow
- Lesser Reedmace
- Cowslip
- Marsh Cinquefoil
- Lesser Spotted Woodpecker
- Chiff Chaff
- Buzzard

Local Nature Reserves

There are several Local Nature Reserves (LNRs) which are not managed by Birmingham and Black Country Wildlife Trust. These include:

- Balaam's Wood
- Bromwich Wood
- Rubery Cuttings
- Edgbaston Reservoir
- Chinn Brook
- Kingfisher Country Park
- Plantsbrook

1.3 Assessment of Cross-Boundary Issues

The City of Birmingham topography is predominantly dominated by lowland characteristics and comprises the catchments of the rivers Tame, Cole and Rea, as well as numerous canal networks. The topography directs the flow in the majority of the watercourses to the east from the higher topography of the Clent Hills, at approximately 248m AOD in the west to the lower Tame Valley in the North-East.

The River Tame enters the City of Birmingham from the Metropolitan Borough of Sandwell near Hamstead. The Tame flows east through Birmingham and enters North Warwickshire Borough at Water Orton.

The River Cole enters the City of Birmingham from the Bromsgrove District near Hawkesley and flows north easterly through the east of Birmingham and enters the Metropolitan Borough of Solihull near Chelmsley Wood.

The River Rea originates slightly outside the City boundary and enters the City of Birmingham from the Bromsgrove District at Rubery. The Rea then travels northeast through the centre of Birmingham, finally flowing into the River Tame at Nechells.

There are seven canals that run through Birmingham. The Birmingham and Fazeley Canal extends northeast into the North Warwickshire Borough. The Birmingham Canal extends northwest into the Metropolitan Borough of Sandwell. The Digbeth Branch Canal joins the Grand Union Canal and the Birmingham and Fazeley Canal near Digbeth. The Grand Union Canal extends southeast into the Metropolitan Borough of Solihull. The Stratford-upon-Avon Canal extends east into the Metropolitan Borough of Solihull. The Tame Valley Canal extends northwest into the Metropolitan Borough of Sandwell. The Worcester and Birmingham Canal extends south into the Bromsgrove District.

See Section 1.5 of the main Level 1 SFRA report for further details on the study area.

As such, future development, both within and outside the City 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 the City has been considered appropriately during the planning stage and appropriate development management decisions are made so 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, the effects of development

should result in no increase in flood risk within the City. In preparing the SFRA the neighbouring authorities were contacted for information on their site allocations, to understand where development in neighbouring authorities may have an impact on locations in Birmingham.

Birmingham City Council are currently preparing a **New Local Plan** for Birmingham for the period up to 2042. The 'Birmingham Plan', once adopted will replace the **Birmingham Development Plan (2017)**, **Aston, Newtown and Lozells Area Action Plan (2012)** and **Longbridge Area Action Plan (2009)**. The 'Issues and Options' document for the new 'Birmingham Plan' is scheduled to go to consultation in Autumn 2022.

Therefore, the evidence base, the flood risk and sustainable drainage policies in the adopted Development Plan (2017-2031) and Aston, Newton and Lozells/Longbridge Area Action Plans 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 too flood risk and drainage:

- **Solihull Metropolitan Borough Council's Local Plan**
- **Bromsgrove District Council's District Plan**
- **Lichfield District Council's Local Plan Strategy**
- **North Warwickshire Borough Council's Local Plan**

The Development Plan Document for the City of Wolverhampton, Metropolitan Borough of Dudley, Metropolitan Borough of Sandwell, and Walsall is the **Black Country Core Strategy (2011)**.

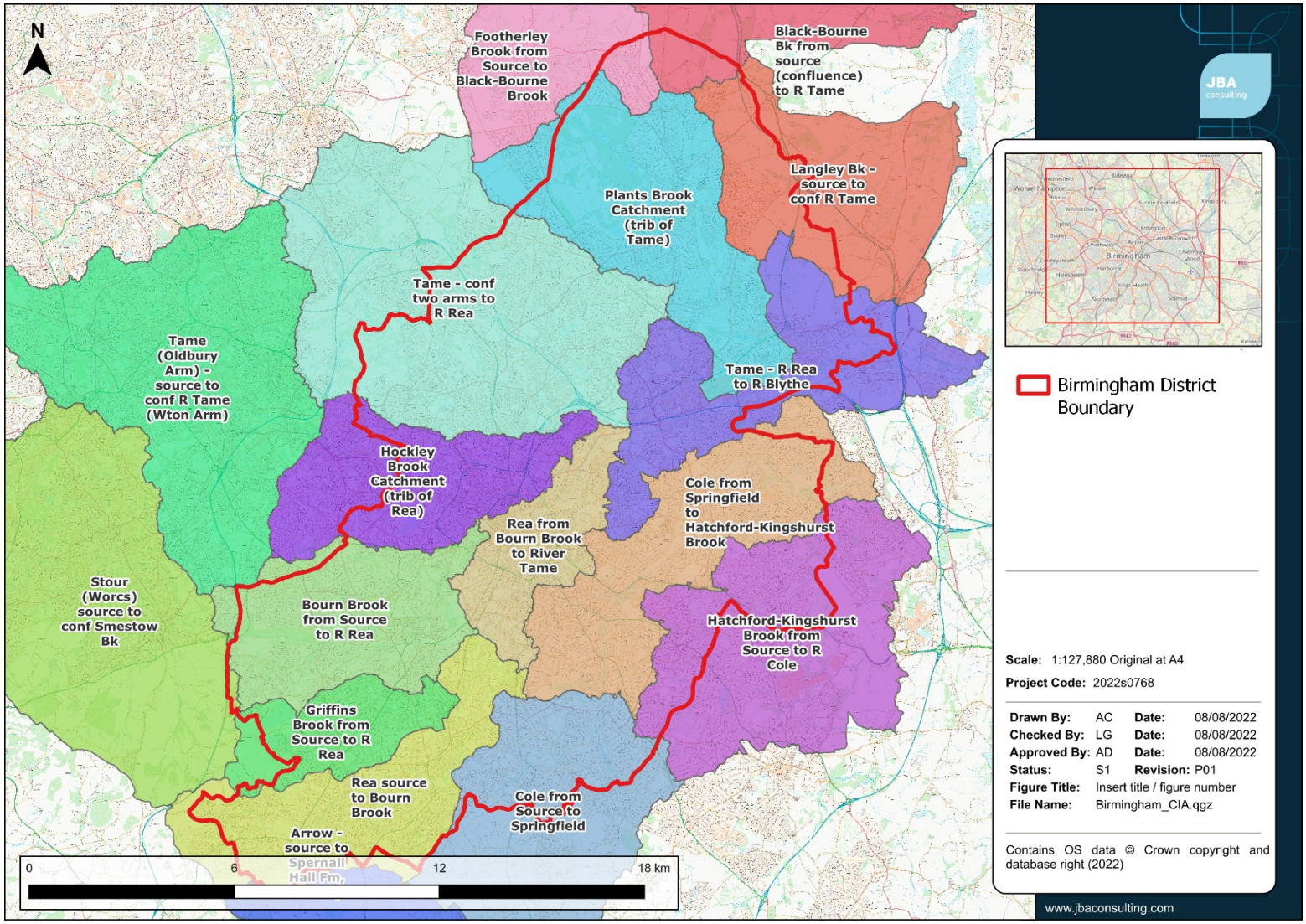

Figure F-1: Catchments within Birmingham City.

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.

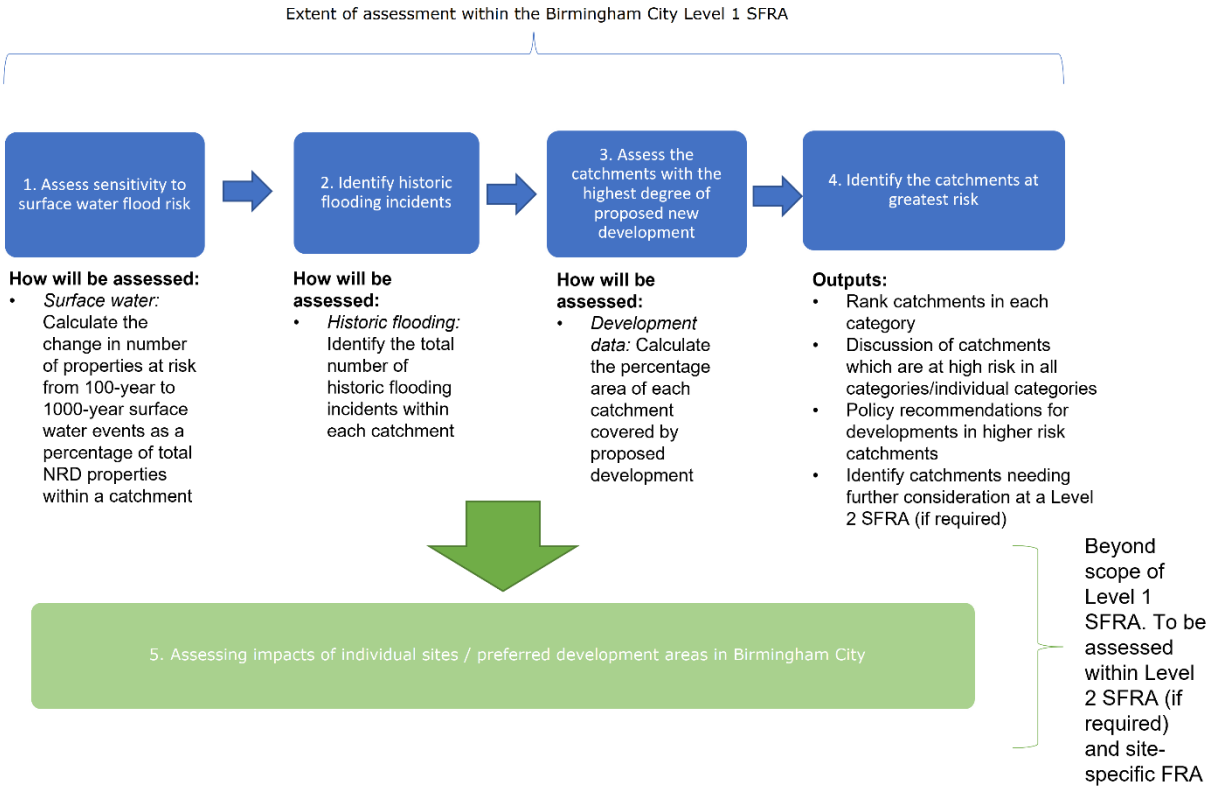

Figure F-2: Overview of the method used within the Cumulative Impact Assessment

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

Future development sites within the study area were provided by the BCC and neighbouring 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); sensitivity to increased risk of surface water flooding; prevalence of recorded flooding incidences; 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 flood flows

For the purpose of the CIA this is the measure of the increase in the number of properties at risk of fluvial flooding from Flood Zone 3 to Flood Zone 2, and 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 Birmingham City 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 Growth in the area

Development within Birmingham City has the potential to affect flood risk in neighbouring authorities, especially if there are existing flood risk issues. The River Tame and River Cole drain from Birmingham District into North Warwickshire District and Solihul District.

Areas for future proposed development were received from the BCC and neighbouring authorities and were assessed as part of this CIA. 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.

1.4.3 Historic flood risk

Recorded flooding events data for fluvial or surface water flooding within most Local Authorities was made available for this assessment. Historic flood risk was also determined from Severn Trent Water. Historic flooding incidents data for sewer flooding were not provided for this assessment. 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.

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 Summary of datasets used within the Broadscale Cumulative Impact Assessment

Dataset	Coverage	Source of Data	Use of Data
Catchment Boundaries	Birmingham City Study Area	Water Framework Directive Catchments	Assessment of susceptibility to cumulative impacts of development by catchment.

Dataset	Coverage	Source of Data	Use of Data
National Receptor Dataset (2021)	Birmingham City Study Area	Environment Agency	Assessing the number of properties at risk of surface water flooding within each catchment.
Risk of Flooding from Surface Water	Birmingham City Study Area	Environment Agency	Assessing the number of properties at risk of surface water flooding within each catchment.
Fluvial Flood Zones 2 and 3	Birmingham City Study Area	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 with planning permission/ previously allocated sites/currently allocated sites)	Birmingham City Study Area & neighbouring authorities	Birmingham City Council; Bromsgrove District Council; Lichfield District Council; North Warwickshire Borough Council; Sandwell District Council; Solihul Metropolitan Borough Council; Tamworth District Council; Walsall District Council.	Assessing the impact of proposed future development on risk of flooding.
Historic Flooding Incidents	Birmingham City Study Area	JBA: Various Section 19 reports, Asset register; Canal and Rivers Trust, Birmingham City Council, Bromsgrove District Council; Dudley Metropolitan Borough Council, Lichfield District Council; North Warwickshire Borough Council.	Assessing incidences of historic flooding within the study area.

1.4.4 Ranking the results

The results for each assessment were ranked into High, Medium and Low risk as shown in Table F-2. The ranking results were combined from all four assessments to give an overall High, Medium and Low ranking for all catchments within the district. Each ranking was then totalled to give a final combined ranking, this was done twice, once without the inclusion of the BCC's proposed development site data (to gain a current baseline), and once including the site data, to provide the development impact ranking. Ranking delineations were given at natural breaks in the results.

Table F-2: Ranking assessment criteria

Flood risk ranking	% of properties at increased	% of properties at increased risk	Total number of Historic	% Area of Catchment Covered by

	risk of Fluvial flooding	of SW flooding	Flooding data points	new development
Low risk	<1%	<1%	<10	<0.1%
Medium risk	1 to 2%	1% to 3%	10-50	2 to 20%
High risk	>2%	>4%	>50	>20%

1.4.5 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 the City.

Table F-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. 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 best available results for the location of historic flooding incidents in Birmingham City and neighbouring authorities.

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 2% properties at increased risk were considered high risk.

Table F-4 Catchments considered highly sensitive to increased fluvial flood risk in future

Catchment	% properties sensitive to increased fluvial flood risk	Rank
Rea from Bourn Brook to River Tame	4.09	1
Tame – R Rea to R Blythe*	1.99	2

* Upgraded to High Risk based on upstream tributary ranking, and a score of 1.99%

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 3% properties at increased risk were considered high risk.

Table F-5 Catchments considered highly sensitive to increased surface water flood risk in future

Catchment	% properties sensitive to increased surface water flood risk	Rank
Tame (Oldbury Arm) – source to conf R Tame (Wton Arm)	6.02	1
Arrow – source to Spernall Hall Fm, Studley	4.51	2
Rea from Bourne Brook to River Tame	4.03	3
Plants Brook Catchment (trib of Tame)	3.96*	4

**Plants Brook Catchment (trib of Tame) uplifted from Medium to High risk due to a development increase score of 3.96% and there being a subsequent data gap*

1.5.3 Prevalence of historic flooding incidents

Historic flood incidents data for fluvial or surface water was available for this assessment, although at the time of the assessment records were not available from all Local Authorities or Severn Trent Water. While this assessment will not provide a detailed scope of historic flooding incidents across all of the region, the number of flood incidents in each catchment from the data available were identified to provide a broadscale understanding of flood risk. Historic Sewer flooding incidents data were not available to be included in this assessment. Catchments with more than 50 recorded incidents were considered high risk.

For a more detailed assessment of historic flood risk or Level 2 SFRA, acquiring historic flooding incidents records from all neighbouring authorities and Severn Trent Water is recommended.

Table F-6 Catchments with the highest number of recorded historic flood incidents

Catchment	Number of recorded incidents	Rank
Arrow – source to Spernall Hall Farm, Studley	135	1
Cole from Source to Springfield	92	2
Stour (Worcs) source to conf Smestow Brook	66	3

1.5.4 Area of proposed development

BCC and most neighbouring 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-7 Catchments with the highest percentage cover of proposed development

Catchment	Area of proposed development (ha)	Area of proposed development (%)	Rank
Footherley Brook from Source to Bleck-Bourne Brook	725.9	24.5	1
Tame (Oldbury Arm) – source to conf R Tame (Wton Arm)	1088.5	18.1	2
Black-Bourne Bk from source (confluence) to R Tame	459.8	12.9	3
Hockley Brook catchment (trib of Rea)	300.2	11.3	4

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 between 10 and 30 were deemed high risk.

The catchments rated as high-risk in the broadscale assessment are shown in Table F-8.

Table F-8: High Risk catchments as shown in Figure F-3

Waterbody Name	Rank
Tame (Oldbury Arm) – source to conf R Tame (Wton Arm)	1
Rea from Bourn Brook to River Tame	2
Tame – R Rea to R Blythe	3
Rea source to Bourn Brook	4
Arrow – source to Spernall Hall Fm, Studley	5

**Arrow – source to Spernall Hall Fm, Studley, uplifted rom Medium to High risk due to being High Risk for Historic incidents and Surface Water Risk, but scoring 33.*

Some catchments that border Birmingham City or are within neighbouring catchments were discounted from the final RAG Assessment outputs as their results were not applicable due to their being no countable data for one or more assessment criteria.

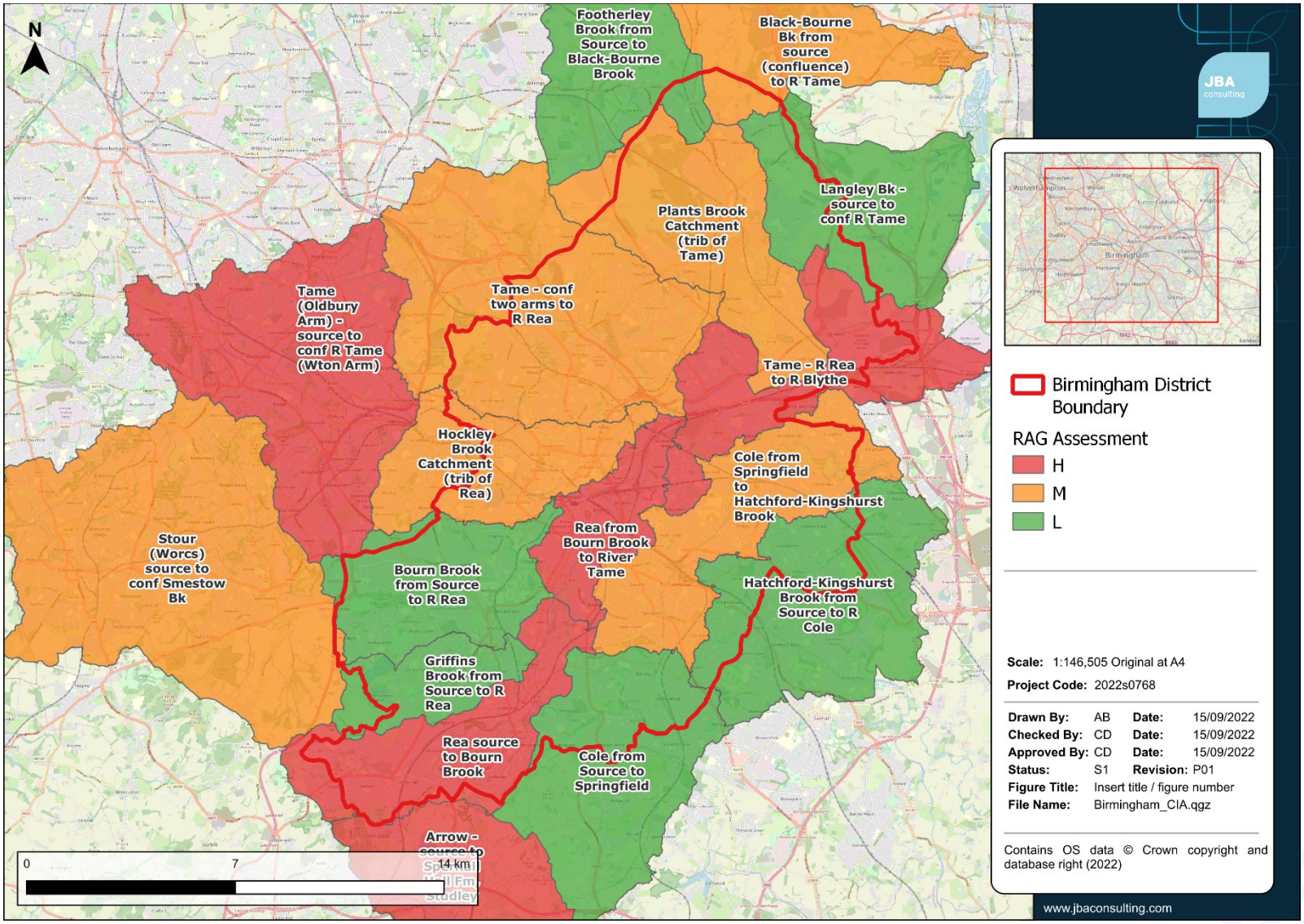

Figure F-3: Final catchment rankings of susceptibility to cumulative impacts of development within Birmingham City

2 Policy Recommendations

2.1 Broadscale Recommendations

The broadscale cumulative impact assessment for Birmingham City 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 the City is appropriate.

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

- The BCC should work closely with 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 (Birmingham City Council) for the requirements for SuDS in Birmingham City, including Technical and Development Type-specific Guidance for Developers.
    - **Birmingham City council Sustainable Drainage – Guide to Design, Adoption and Maintenance**

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

- Birmingham City 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 Birmingham City.
- 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.

- BCC 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 report details the local requirements for mitigation measures. Catchment-specific recommendations are made for high-risk catchments below.

2.2 Recommendations for high-risk catchments

High risk catchments are detailed in Table F-8. 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. Within the FRA consideration should be given to the potential cumulative effects of all proposed development and how this affects sensitive receptors.

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.

For developments in High-Risk catchments, the LLFA and LPA 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

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 natural flood management features.

The LPAs 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.

The LLFA should work closely with the EA to identify any areas of land that should be safeguarded for any future flood alleviation and natural flood management features in the upper catchments.

2.3 Development within Medium risk catchments

Catchments that have been scored an overall ranking of medium, but where development proposals are present 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 natural flood management 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.

Medium Risk Catchments within Birmingham City:

- Plants Brook Catchment (trib of Tame)
- Tame – conf two arms to R Rea
- Stour (Worcs) source to conf Smestow Bk
- Hockley Brook Catchment (trib of Rea)
- Cole from Springfield to Hatchford-Kingshurst Brook
- Black-Bourne Bk from source (confluence) to R Tame