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Bury Council Level 1 SFRA

Appendix G - Catchment-level assessment of the Cumulative impacts of Development on Flood Risk

Final Report

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Abbreviations

AEP	Annual Exceedance Probability
CDA	Critical Drainage Area
EA	Environment Agency
FRA	Flood Risk Assessment
GMCA	Greater Manchester Combined Authority
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
NRD	National Receptor Dataset
RAG	Red-Amber-Green
RFO	Recorded Flood Outline
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SuDS	Sustainable drainage systems
WFD	Water Framework Directive

1 Introduction

Cumulative impacts are defined as the effects of past, current and future activities on the environment. The below assessment is a catchment based approach, which indicates potential cumulative impacts on the Bury Council (the Council) authority area. These cumulative impacts may be negative, such as development leading to an increase in the existing level of flood risk within a catchment. They may also be positive, such as effective surface water management within a development site helping to alleviate existing flooding issues within a catchment.

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.'

To understand the impact of future development on flood risk in the Council area, flood risk data has been compared with potential changes in developed area within each river catchment defined within the Water Framework Directive (WFD). This identifies the catchments where development may have the greatest impact on flood risk, and therefore where further assessment would be required within a site-specific Flood Risk Assessment (FRA).

Where catchments have been identified as sensitive to the cumulative impact of development, the assessment concludes with potential strategic planning policy suggestions to manage the risk.

2 Cumulative Impact Assessment Methodology

2.1 Cumulative impact of development and flood risk

2.1.1 Introduction

The cumulative impact of development is assessed in two parts. These comprise an evaluation of future development pressures within each WFD river waterbody catchment and an assessment of historical and predicted future flood risk. The approach to understanding the catchments most influenced by the cumulative impact of development is conceptualised in Figure 2-1.

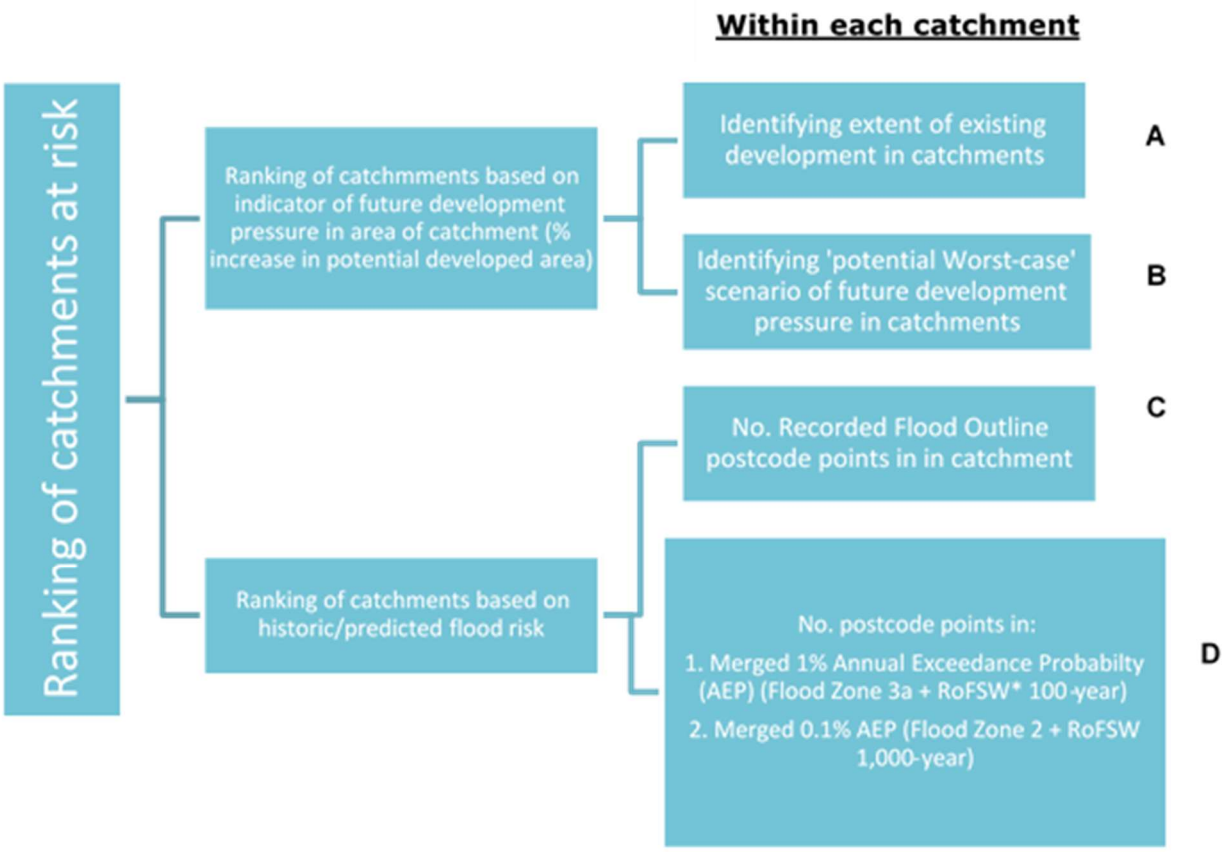

Figure 2-1: Overview of the method used in the cumulative impact assessment

*Risk of Flooding from Surface Water (RoFSW)

2.1.2 Assessing existing and future development scenarios

To ensure that the strategic policies of the new Local Plan consider the impact of any future development on areas susceptible to flooding, the potential development pressures during the new Local Plan period need to be considered. The impact of development is assessed by establishing a growth scenario of development already committed to prior to the preparation of the Local Plan, as well as the potential future development pressures during the active Local Plan period.

The assessment is undertaken on a river catchment scale, using catchments defined by the WFD. Several of the WFD river waterbody catchments assessed within the cumulative impact assessment cross administrative boundaries into neighbouring districts. To account for this in the study, all councils that share a WFD river waterbody catchment with Bury were contacted to provide information of future development within their administrative area. These councils are:

- Blackburn with Darwen Borough Council
- Bolton Council
- Manchester City Council
- Rochdale Council
- Rossendale Borough Council
- Salford City Council

The site allocation information provided by these neighbouring authorities was combined with that of the Council's to understand the risk to each WFD river waterbody catchment, based upon potential future growth.

It should be noted that the inclusion of potential future development pressures in neighbouring authorities makes the scoring method sensitive to future change, should any larger sites be removed, or additional sites come forward. However, it provides the best possible indication of development pressure across the Council area and catchments that feed into it. Potential future development for Blackburn with Darwen and Bolton was not included within this assessment, as suitable information was not made available at the time of the assessment.

2.1.2.1 Existing development scenario (Part A - Figure 2-1)

To understand the level of existing development within the study area, the Environment Agency's (EA) National Receptor Dataset (NRD) covering the Council area and neighbouring authority areas was used to establish the baseline growth scenario.

2.1.2.2 Indicator of development pressure (Part B - Figure 2-1)

To understand which catchments within the Council area are likely to experience the greatest pressure or future growth, all sites that were either allocated or preferred for allocation within the new Local Plan for Bury, as well as the allocated sites and land supply data provided by the neighbouring authorities, were analysed. This analysis serves as an indicator of areas likely to be subject to the greatest development pressure in the future. At the time of preparing the assessment, this is the only spatial data indicator available, as definitive development areas have not yet been allocated within all the Local Plans of the neighbouring authorities.

This data allows calculation of the overall area of sites within each catchment that are either proposed or submitted to the relevant Local Planning Authority (LPA) for consideration to allocate within their Local Plans, illustrating the relative pressures on the catchments. The

percentage total proposed area of development is calculated and ranked, with the catchment with the highest proportion of growth ranked as '1'.

2.1.3 Datasets used to assess future development pressures

Table 2-1 provides an overview of the datasets considered within the future development section of the cumulative impact assessment.

Table 2-1: Data considered within the development assessment and their purpose

Dataset	Coverage	Source of data	Purpose
Catchment boundaries	Bury Council authority area	WFD river waterbody catchments (Environment Agency)	To identify and map catchments that will determine the study area extent
Existing development data	Catchments covering the Bury Council authority area	National Receptor Dataset (Environment Agency)	To provide the existing development scenario
Local Plan allocations and committed developments	Catchments covering the Bury Council authority area	Bury Council Blackburn with Darwen Borough Council Manchester City Council Rochdale Council Rossendale Borough Council Salford City Council	To provide an indicator of relative future development pressures within the study area

2.1.4 Assessing the sensitivity to flood risk

In addition to the assessment of future development pressures, a composite flood risk score is derived for each catchment. This is calculated by taking an average ranking of both recorded flood risk (historic incidents) and modelled (predicted) fluvial and surface water risk. To understand the relative flood risk within each catchment, a ranking system is adopted, with the worst-case flood risk numbered as '1'.

2.1.4.1 Historic flood risk (Part C - Figure 2-1)

To understand the impact to property from historic flood incidents, the EA Recorded Flood Outline (RFO) dataset was considered. This was intersected with the NRD points within each catchment to provide a count for the number of historically impacted properties per catchment.

2.1.4.2 Sensitivity to increases in flood flows (Part D - Figure 2-1)

To understand the sensitivity of each catchment to increases in flood flows, an assessment of both fluvial and surface water flood risk was undertaken. This assessment provides an indication of where local topography makes an area more sensitive to increases in flood risk. This 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 present day flood risk scenario is based on the 1 in 100-year (1% Annual Exceedance Probability (AEP)) event, using a combination of the EA Flood Zone 3 and medium risk RoFSW mapping. The future flood risk scenario is based on the 1 in 1000-year (0.1% AEP) event and is determined using a combination of the EA Flood Zone 2 and low risk RoFSW mapping. The fluvial and surface water flood extents are merged to prevent double counting of properties at risk where fluvial and surface water flood risks overlap.

The present and future flood risk scenarios have been separately intersected with the NRD to approximate the number of properties at risk within each scenario. The difference between the number of properties within the present and future flood risk scenarios has been calculated and given as a percentage of the total number of NRD points within the catchment. This gives an indication of which catchments are most sensitive to increases in surface water runoff upstream.

2.1.5 Datasets used to assess the sensitivity to flood risk

Table 2-2 provides an overview of the datasets considered within the flood risk section of the cumulative impact assessment.

Table 2-2: Data considered within the flood risk assessment and their purpose

Dataset	Coverage	Source of data	Purpose
Catchment boundaries	Bury Council authority area	WFD river waterbody catchments (Environment Agency)	To identify and map catchments that will determine the study area extent
Property point data	Catchments covering the Bury Council authority area	National Receptor Dataset (Environment Agency)	To provide an indication of the number of properties at risk
Historic flood incidents	Catchments covering the Bury Council authority area	Recorded Flood Outlines (Environment Agency)	To understand which areas have been impacted by historic flooding
Fluvial flood zones	Catchments covering the Bury Council authority area	Flood Map for Planning Flood Zones 2 and 3 (Environment Agency)	To understand the present day and potential future impacts of fluvial flooding
Surface water flood zones	Catchments covering the Bury Council authority area	Risk of Flooding from Surface Water - low and medium risk (Environment Agency)	To understand the present day and potential future impacts of surface water flooding

3 Results

3.1 Introduction

The results are ranked for each of the above assessments from 1 to 10. For example, the catchment with the highest percentage of property points within the recorded flood outline dataset would be ranked as '1'. The individual historic flooding, flood risk sensitivity and future development pressure ranks are summed to give an overall ranking for each catchment. The catchment with the lowest combined rank is the most sensitive to the cumulative impact of development.

3.2 Cumulative impact assessment results

A Red Amber Green (RAG) rating is applied to the catchments, with red being high sensitivity, amber being medium sensitivity and green being low sensitivity. It should be noted that this assessment provides a relative assessment of sensitivity increases in flood risk and development between catchments within the study area.

A map of the RAG rating for each catchment is shown in Figure 3-1 and a summary of the results is shown in Table 3-1.

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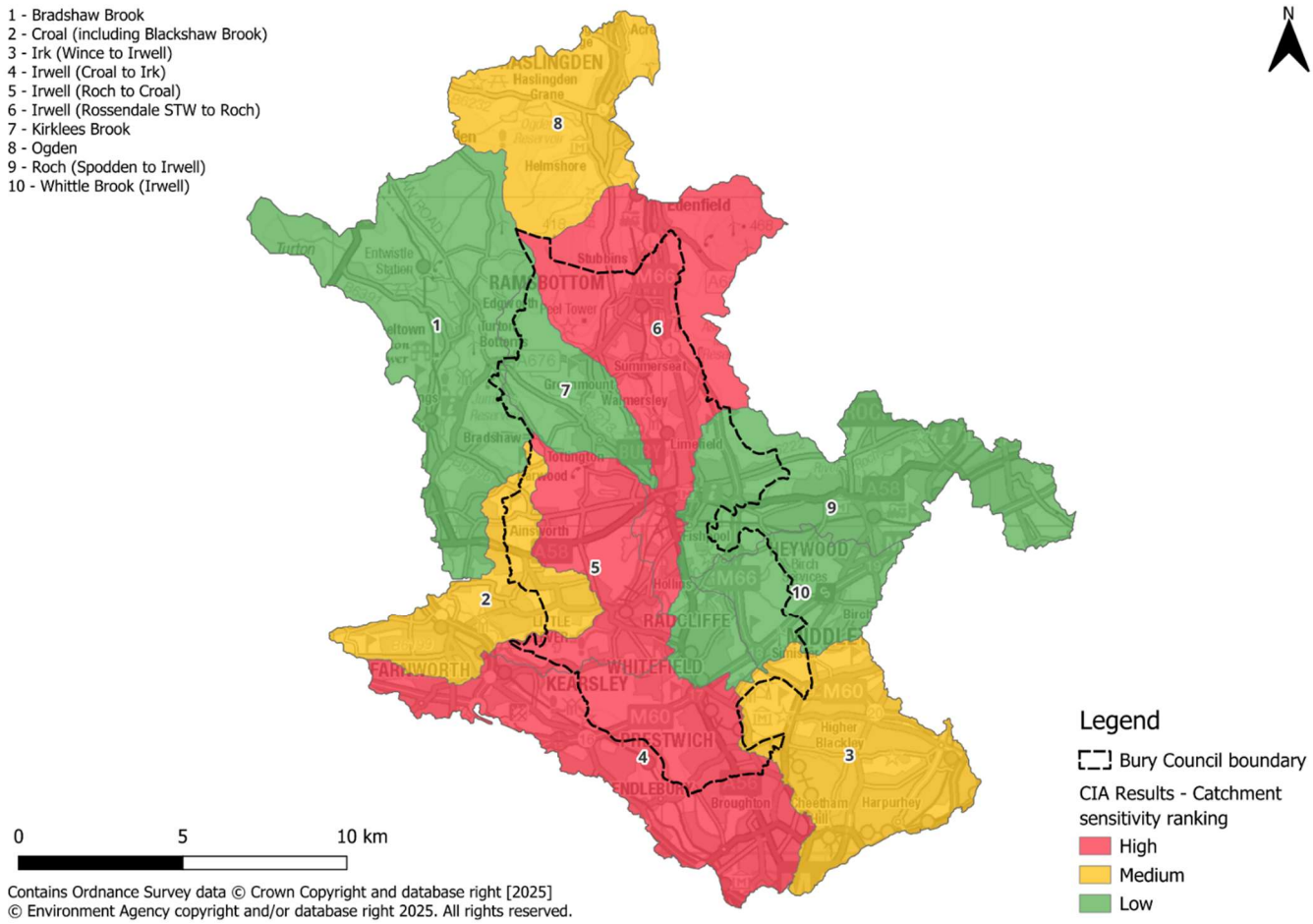

Figure 3-1: Sensitivity of catchments within and around the Bury Council study area to cumulative impacts

Table 3-1: Results of cumulative impact assessment

Map label	Catchment name	Drainage direction	Area of growth (%)	Growth RAG score	Property points in historic flood outlines	Increase in properties at flood risk (%)	Flood risk RAG score	Overall RAG score	Overall rank
1	Bradshaw Brook	Flows from Bury into Bolton	0%	Low	13	5.6%	Low	Low	10
2	Croal (including Blackshaw Brook)	Flows from Bury into Bolton	0.2%	Low	59	7.4%	Medium	Medium	6
3	Irk (Wince to Irwell)	Flows from Bury and Rochdale into Manchester	8.9%	High	3	9.6%	Medium	Medium	5
4	Irwell (Croal to Irk)	Flows from Bolton and Salford into Bury	1.1%	Medium	5984	16.5%	High	High	2
5	Irwell (Roch to Croal)	Flows from Bury into Bolton	12.4%	High	135	10.3%	High	High	1
6	Irwell (Rossendale STW to Roch)	Flows from Rossendale into Bury	1.7%	Medium	1251	11.2%	High	High	3
7	Kirklees Brook	Flows from Blackburn with Darwen into Bury	0.6%	Low	1	6.4%	Low	Low	9
8	Ogden	Flows from Rossendale into Bury	1.9%	Medium	31	7.4%	Medium	Medium	4

Map label	Catchment name	Drainage direction	Area of growth (%)	Growth RAG score	Property points in historic flood outlines	Increase in properties at flood risk (%)	Flood risk RAG score	Overall RAG score	Overall rank
9	Roch (Spodden to Irwell)	Flows from Rochdale into Bury	1.4%	Medium	31	5.8%	Low	Low	8
10	Whittle Brook (Irwell)	Flows from Rochdale into Bury	28.7%	High	0	5.8%	Low	Low	7

4 Assumptions and limitations

Table 4-1 sets out the assumptions and limitations of the cumulative impact assessment.

Table 4-1: Assumptions and limitations of the assessment

Assessment aspect	Assumption made	Details of limitation in method	Justification
Development pressure	Assumption of housing density and impermeable areas	Where potential development densities were not known for the sites, it is assumed that 70% of the site area would contribute surface water runoff to the wider catchment. This takes into account a 30% allowance for landscaping and requirements for sustainable drainage systems (SuDS) within sites, which lessens the impacts of new development	With housing densities and proportions of undeveloped areas not known, the approach aims to provide a more realistic indication of site development in the growth scenario
Development pressure	Current site use assumed to be greenfield (undeveloped)	The current use of the sites (e.g. greenfield/brownfield) is often undefined. Brownfield sites are likely to have a less significant impact on flood risk as they have previously been developed. Therefore, in absence of this information, a 'worst case' assessment is produced, which assumes that all sites are greenfield (undeveloped) and may overestimate the risk within each catchment	The assessment considers the 'worst case' development scenario, that all sites were greenfield (undeveloped) prior to growth. With the former land uses for each site not known, the approach overestimates the potential impact, but this is a precautionary approach
Development pressure	Potential development site area not provided for all neighbouring authorities	Potential development sites were not made available for the Bolton and Blackburn with Darwen authority areas.	Potential development pressure was not taken into account for the WFD catchments shared between Bury and Bolton and Blackburn with Darwen. Cumulative impacts were assessed through flood risk only.

Assessment aspect	Assumption made	Details of limitation in method	Justification
			It is recommended that this assessment is updated should this information be made available.
Flood risk	Overlap between fluvial and surface water extents	The Risk of Flooding from Surface Water mapping identifies the lowest points in the landscape, and therefore low-lying river floodplains are also classified as being at surface water risk. This can lead to 'double counting' of flood risk.	To prevent double counting, the Flood Zone and Risk of Flooding from Surface Water datasets are merged, to create a composite flood risk layer, with any overlapping areas dissolved.
Flood risk	Conservative assumption of using the 1 in 1000-year event to represent the future 1 in 100-year event	The 1 in 1000-year has been used as a conservative proxy to represent the likely influence of climate change on a fluvial 1 in 100-year flood event to inform on the sensitivity of catchments to increases in flooding.	This approach has been taken to ensure a consistent approach between the consideration of fluvial and surface water flooding. There is no suitable surface water climate change information currently available from the EA at the time of writing.
Flood risk	Use of property points without considering property footprints to inform location of development	The National Receptor Dataset property points have been used to locate properties relative to the flood risk data. Those points represent a single coordinate and do not capture building footprints. As a result, properties whose building footprint falls inside the flood extent can have their receptor point outside it, producing a likely undercount of at-risk properties	The National Receptor Dataset was used as it is a consistent, nationally available representation of property locations. As the CIA compares counts between the 1 in 1000-year and 1 in 100-year flood extents, any locations where this issue is observed is relative between the two events and will likely have a limited impact on final results.

5 Planning policy considerations

5.1 Introduction

Catchment-specific planning policy considerations have been identified for the catchments where cumulative development is likely to have the greatest impact on flood risk to communities.

In addition to assessment at this Level 1 SFRA level, it is recommended that site-specific FRAs are required to include consideration of the cumulative effects of the proposed development. It should be demonstrated that flood risk downstream will not be made worse by the combination of effects from more than one development allocation.

Specific policy considerations are provided for each sensitivity category and are set out in Sections 5.2 to 5.4 below.

5.2 Considerations for all new development in Bury

The following planning policy considerations apply to development within all catchments:

- Developments should seek betterment of existing flood risks both within the site and in surrounding areas. As a minimum, developments must meet national and local standards for FRAs and surface water drainage strategies. By looking at flood risks beyond the site boundary, developers should be encouraged to implement sustainable solutions which manage flood risk. The Bury Local Plan states:
    - Proposals must be designed to maximise the retention of surface water on-site and minimise the volume. Developments on greenfield sites are expected to achieve greenfield run-off rates.
    - Proposals on previously developed land should target a greenfield rate of surface water run-off. However, as a minimum, proposals on previously developed land must achieve a reduction in the rate of surface water discharge of 40%.
- Major developments[1] should be accompanied by an overall surface water drainage strategy. This should cover:
    - How the cumulative impacts of potential peak rates and volumes of surface water runoff from development sites would impact on the peak flows, duration of flooding and timing of flood peaks on receiving watercourses. This should be used to develop and implement appropriate drainage sub-catchments for

1 As defined in the NPPF as residential developments comprising 10 or more homes, or greater than 0.5 hectares in area, and for non-residential developments, additional floorspace of 1,000m^2 or more, or a site of 1 hectare or more, or as otherwise provided in the Town and Country Planning (Development Management Procedure) (England) Order 2015.

the management of surface water, as well as specific runoff rate and volume requirements for each phase of the development.
    - The risk of flooding from all sources, including for rainfall events greater than the design standard of the surface water drainage system should be taken into account. This is to ensure there is no flood risk to new properties, and that exceedance flows in extreme events are safely routed around those properties.
    - The consideration of how SuDS, natural flood management techniques, green infrastructure and green-blue corridors can be designed into the development master plan to facilitate drainage flood risk management. As well as managing the quantity of water, they should also ensure the wider benefits of biodiversity, amenity, water quality and recreation are realised.
    - Based on the above, a drainage phasing plan aligned with the SuDS management train method should be developed. Firstly, it should consider how water can be infiltrated / stored at a plot level, then conveyed through the site. It should also identify any wider storage needs at a settlement level.
    - The provision of drainage shall be based on the drainage phasing plan, to ensure adequate drainage is provided and implemented throughout the lifetime of the development. This includes provision of adequate drainage during the construction phase, to manage the risk of flooding, erosion and pollution during construction.
    - The Council (as LPA and Lead Local Flood Authority (LLFA)) and the EA should be consulted during the development of the surface water drainage strategy, subject to EA resource availability.
- In rural areas of the catchments, Natural Flood Management (NFM) techniques, such as woodland planting and earth bunds, can be used to slow down and store flood waters upstream of settlements.
- In urban and suburban locations, SuDS should be integrated into the site design, to manage the existing surface water flow paths on the site and to help mitigate the flood risks to downstream communities.
- Successive minor developments have the potential to significantly impact on existing surface water and flood risk issues, particularly as the LLFA is not currently consulted on such applications. Therefore, planning policy for minor developments should support existing LPA guidance on the reduction of existing runoff rates, through the use of SuDS.
- Any development within the fluvial floodplain (i.e. Flood Zones 3b, 3a and 2) should provide suitable flood compensation storage, in consultation with the EA, to avoid a net loss in floodplain storage.
- The LLFA and other Risk Management Authorities (RMAs) should use the information in the SFRA to inform a long term pipeline of flood alleviation studies and schemes to determine where further developer contributions on / off site would be beneficial.

5.3 Considerations for medium sensitivity catchments

The following planning policy considerations apply to development within those catchments identified as being at medium sensitivity. All new developments (other than minor extensions) in these catchments should:

- Incorporate SuDS and provide details of adoption, ongoing maintenance, and management, in line with the National Standards for SuDS2. Preference will be given to above ground, vegetated SuDS, which contribute to the conservation and enhancement of biodiversity and green infrastructure in the study area.
- Be incentivised to provide wider betterment by being requested to demonstrate in site-specific FRAs and surface water drainage strategies what measures can be put in place to contribute to a reduction in flood risk downstream. This may either be through 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 a wider community scheme.
- Ensure both greenfield and brownfield developments are to aim to achieve greenfield runoff rates and volumes in their post-development state.
- Ensure Surface Water Management Plans are developed as required.

5.4 Considerations for higher sensitivity catchments

The following planning policy considerations apply to development within those catchments identified as being at higher sensitivity. For all new developments (other than minor extensions) in these catchments, consider:

- National and local flood risk planning policy must be stringently applied within these areas, with flood risk from all sources given the appropriate priority, particularly when applying the sequential and exception tests.
- Both greenfield and brownfield developments to achieve 20% betterment over pre-development greenfield runoff peak flows[3] and volumes[4] in their post-development state, to counter cumulative impacts of development within the catchment.
- A surface water drainage strategy should be required for all developments in these catchments, regardless of development size. This would mean that a site-specific FRA would be required for all developments, regardless of their size.
- The Greater Manchester Combined Authority (GMCA) have designated Critical Drainage Areas (CDAs) for Greater Manchester. Through this Level 1 SFRA, an additional CDA has been identified, covering Ramsbottom. For proposals on previously developed land within a CDA, a 55% reduction in the rate of surface

2 National Standards for SuDS

3 For the 1 in 1 year rainfall event and the 1 in 100 year rainfall event

4 For the 1 in 100 year, 6 hour rainfall event

water discharge must be achieved. This rate of reduction will increase to 70% for proposals within Flood Zone 3, in line with the Bury Local Plan.

- For larger sites and strategic developments (e.g. new settlements and urban extensions):
  - The LLFA, EA and LPA should be consulted at pre-application stage.
  - The FRA should examine the cumulative impacts of proposed peak surface water runoff rates and volumes from across the site on the peak flows, duration of flooding and timing of flood peaks in receiving watercourses. This should include the impact of other developments within the WFD catchment, if appropriate, as advised by the LPA/LLFA.
  - A surface water drainage strategy should be developed and implement appropriate drainage sub-catchments for the management of surface water, with specific runoff rate and volume requirements set for each sub-catchment, in line with the SuDS management train.
- Particular attention should be given to limiting runoff volumes to greenfield volume, with long-term storage to be provided where required. The timing of runoff released from the development site will need to be assessed against peak flow timings on the receiving watercourse, to ensure that discharges do not have a detrimental impact on downstream flood risk.
  - The timing of flows released from the development site will need to be assessed in the context of peak flows on the receiving watercourse.
  - Every opportunity should be taken to infiltrate and/or store water at a plot level.
  - Longer-term measures for managing flood risk should be considered, including river restoration and contributions to pipeline flood alleviation schemes.
- Where development sites receive runoff from, or drain towards, neighbouring authorities, the LPA should work closely with neighbouring LPAs and the LLFA to develop complementary local plan policies on cumulative flood risk and sustainable drainage.

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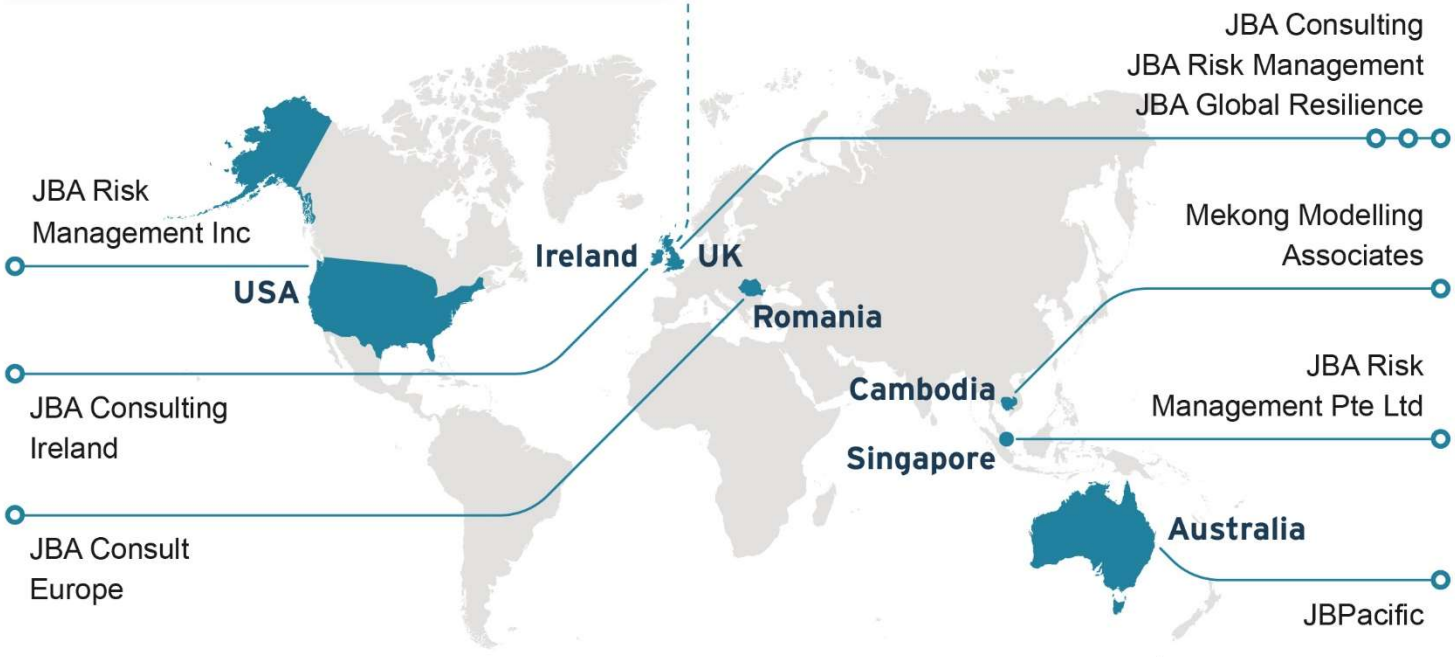

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