# Kirklees Council Level 1 SFRA - Appendix D

## Catchment-level assessment of Cumulative Impacts of Development on Flood Risk Final Report

April 2026

Prepared for:

Kirklees Council

www.jbaconsulting.com

# Contents


**1 Introduction 1**

**2 Method 2**

2.1 Cumulative impact assessment 2


## List of Figures


Figure 2-1: Overview of the method used in the Cumulative Impacts Assessment 3

Figure 2-2: Sensitivity of catchments within and around the Kirklees study area to cumulative impacts 12


## List of Tables


Table 2-1: Summary of datasets used to define river catchments 4

Table 2-2: Summary of datasets used to estimate future development pressure 4

Table 2-3: Summary of datasets used to rank catchments by flood risk 4

Table 2-4: Assumptions and limitations of the assessment 6

Table 2-5: Breakdown in rankings for each assessment 8

Table 2-6: Results of cumulative impacts assessment (High Overall Rank) 13

Table 2-7: Results of cumulative impacts assessment (Medium Overall Rank) 15

Table 2-8: Results of cumulative impacts assessment (Low Overall Rank) 17

# 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 Kirklees 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 Kirklees, historic 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 Method

## 2.1 Cumulative impact assessment

### 2.1.1 Cumulative impact of development: assessing existing and future development scenarios

To ensure that the strategic policies of the Local Plan consider the impact of any future development on areas susceptible to flooding, the potential development pressures during the Local Plan period need to be considered.

The impact of development is assessed by establishing a growth scenario of development already committed prior to the Local Plan, as well as the potential future development pressures during the Local Plan period.

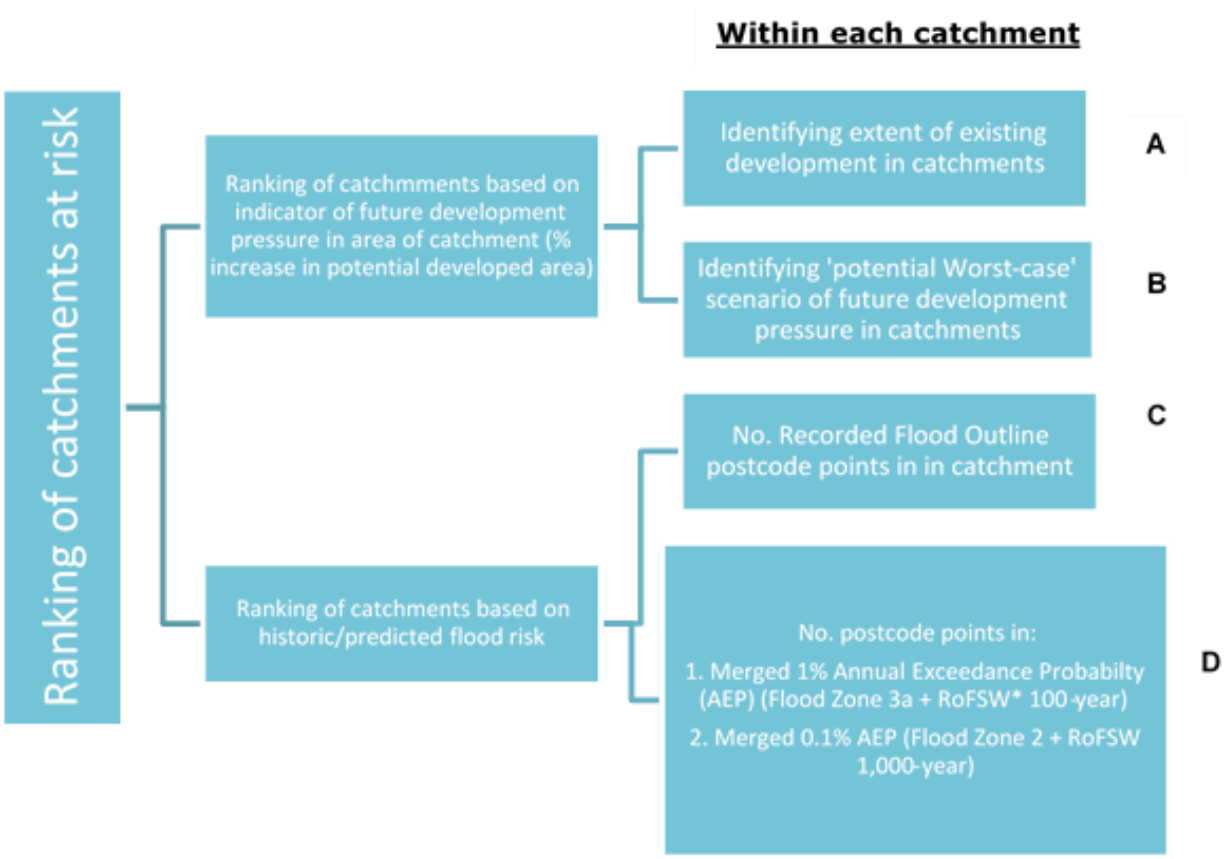
It should be noted that the inclusion of potential future development pressures in neighbouring authorities makes the scoring method sensitive to future change, should any larger sites be removed, or additional sites come forward.

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

- Barnsley
- Bradford
- Calderdale
- High Peak
- Leeds
- Oldham
- Wakefield

The site data received from these councils was assessed to understand the risk to each WFD catchment, based upon potential future growth.

The approach to understanding the catchments most influenced by the cumulative impact of development is conceptualised in Figure 2-1.




**Risk of Flooding from Surface Water (RoFSW)*

Figure 2-1: Overview of the method used in the Cumulative Impacts Assessment

**A. Existing development scenario**

To understand the level of existing development within the study area, the OS Code Point Open postcode points covering the Kirklees Council authority area were used. This data set contains points plotted at the average co-ordinates representative of all individual addresses within a particular postcode. This also covered the neighbouring authority areas.

**B. Indicator of Development pressure**

To understand which catchments within the study area are likely to experience the greatest pressure for future growth, all sites which were either allocated or preferred for allocation within the Local Plan for Kirklees, and neighbouring authorities Barnsley, Bradford, Calderdale, Leeds, Oldham and Wakefield neighbouring authorities were analysed.

This analysis has been used as an indicator of areas likely to be subject to the greatest development pressure in future. This is the only spatial data indicator available at the time of preparing the assessment because definitive development areas have not yet been allocated within all Local Plans within the study area.

The data allows calculation of the overall area of sites within each catchment which are either proposed or submitted to the relevant Local Planning Authority to consider, for allocation within the Local Plan, illustrating the relative pressures on the catchments. This

data is used to identify catchments likely to be under the greatest pressure for development. The percentage total proposed area of development is calculated and ranked with the catchment with the highest proportion of growth ranked as '1'.

Sites information for High Peak **is** not included in this assessment, as suitable information was not made available at the time of the assessment.

Table 2-1: Summary of datasets used to define river catchments

| Dataset | Coverage | Source of data | Use of data |
|---|---|---|---|
| Catchment boundaries | Kirklees Council authority area | Water Framework Directive (WFD) catchments | Existing development / flood risk |

Table 2-2: Summary of datasets used to estimate future development pressure

| Dataset | Coverage | Source of data | Use of data |
|---|---|---|---|
| Kirklees Council / neighbouring authority Local Plan allocations and committed developments | Catchments covering the Kirklees Council authority area | Kirklees Council, Barnsley Council, Bradford Council, Calderdale Council, Leeds Council, Oldham Council and Wakefield Council | Indicator of relative development pressure |

Table 2-3: Summary of datasets used to rank catchments by flood risk

| Dataset | Coverage | Source of data | Use of data |
|---|---|---|---|
| Merged 1 in 100-year flood extent (Flood Zone 3 and 1 in 100-year RoFSW extent) | Catchments covering the Kirklees Council authority area | Environment Agency (EA) | Potential fluvial and surface water flood risk |
| Merged 1 in 1000-year flood extent (Flood Zone 2 and 3, and 1 in 1000-year RoFSW extent) | Catchments covering the Kirklees Council authority area | Environment Agency (EA) | Potential future fluvial and surface water flood risk |
| Recorded Flood Outline | Catchments covering the Kirklees Council authority area | Environment Agency (EA) | Historic fluvial flooding |

| Dataset | Coverage | Source of data | Use of data |
|---|---|---|---|
| OS Code Point Open postcode points - plotted at the average co-ordinates representative of all individual addresses within a particular postcode | Catchments covering the Kirklees Council authority area | Ordnance Survey (Open source) | Proxy for number of properties at risk |

### 2.1.2 Cumulative impact of flood risk: assessment of flood risk

A composite flood risk score is derived for each catchment, by taking an average ranking of both recorded fluvial risk (historic incidents) and modelled (predicted) fluvial and surface water flood risk.

To understand the relative flood risk within the catchments, a ranking system is adopted, with the worst-case flood risk numbered '1'.

**C. Historic flood risk**

Data used in assessment:

- EA Recorded Flood Outline (number of property postcode points affected) - flood extents mapped following flood events (largely relates to fluvial flooding). This is intersected with postcode points, to approximate the number of properties affected.

**D. Sensitivity to increases in flood flows**

Data used in assessment:

- Present day risk: Merged fluvial and surface water 1 in 100-year (1% AEP) flood extent - Flood Zone 3 and RoFSW 100-year (number of postcode points at risk within catchment).
- Future risk: Merged fluvial and surface water 1 in 1,000-year (0.1% AEP) flood extent - Flood Zone 2 (and 3) and RoFSW 1000-year (number of postcode points at risk within catchment).
- Postcode point data is used to identify properties within the Kirklees study area.
- The postcode data is separately intersected with the Present day (1 in 100-year) and Future (1 in 1,000-year) risk merged fluvial and surface water flood extents, to approximate the increase in the number of properties at risk of flooding. The flood extents are merged to prevent double counting of properties at risk where fluvial and surface water flood risks overlap.
- The difference between the Present and Future risk is then calculated and given as a percentage of the total number of OS Code Point Open points in the catchment. This gives an indication of which catchments are most sensitive to increases in surface water runoff from upstream. For example, if there were 100

postcode points in a catchment, 15 within the 1 in 1,000-year merged flood extent and 5 within the 1 in 100-year merged flood extent, 10% of properties in that catchment are considered sensitive to increased flood risk.

- The assessment is an indicator 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.
- It is noted that the use of the 1 in 1,000-year fluvial and surface water data is a less representative of the impact from climate change than direct climate change modelling. However, in the absence of a suitable surface water climate change dataset the 1 in 1,000-year data has been used to maintain consistency between both sources of flooding. The cumulative impact assessment is intended to be a high-level assessment showing indicative areas that may be more sensitive to increases in flood risk.
- It should be noted that the Flood Zones represent flood risk from watercourses, with a catchment area greater than 3km$^2$. Where the EA have suitable data for smaller catchments, this is also included in the Flood Zones.

### 2.1.3 Assessment assumptions and limitations

Table 2-4 sets out the assumptions and limitations of the cumulative impacts assessment.

Table 2-4: 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 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. |

| Assessment aspect | Assumption made | Details of limitation in method | Justification |
|---|---|---|---|
| Development pressure | Potential development site area not provided for High Peak authority area | Potential development sites were not made available for High Peak authority area. | Potential development pressure was not taken into account for the WFD catchments shared between Kirklees and High Peak. Cumulative impacts were assessed through flood risk only.<br>It is recommended that this assessment is updated should this information be made available. |
| 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. |
| Flood risk | Overlap between fluvial and surface water flood 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. |

| Assessment aspect | Assumption made | Details of limitation in method | Justification |
|---|---|---|---|
| Flood risk | Use of OS Code Point Open postcode point data to represent properties affected by historic/predicted flood risk | As postcode points represent the average location of all properties within a postcode area, there may be properties at the edges of a catchment or the study area which are counted within the neighbouring area, or not picked up at all. The dataset is based on full postcodes. | The postcode points are an available open source dataset. Postcode area sizes are also relative to the density of properties in a location, providing better data coverage in areas where a greater number of properties were likely to be affected. |

### 2.1.4 Ranking the results

The results are ranked for each of the above assessments from 1 to 28. For example, the catchment with the highest percentage of code points within the recorded flood outline dataset would be ranked at number 1. The individual flood risk, historic flooding and development ranks are added to give an overall ranking for each catchment, as indicated in Table 2-5. The catchment with the lowest combined rank is the most sensitive to the cumulative impact of development.

Table 2-5: Breakdown in rankings for each assessment

| Catchment Name | Growth rank | Historic Flood Risk rank | Predicted Flood Risk rank | Total Combined rank | Overall rank |
|---|---|---|---|---|---|
| Chald from Source to River Calder | 1 | 2 | 3 | 6 | 1 |
| Calder from River Colne to River Chald | 3 | 5 | 1 | 9 | 2 |
| Calder from Ryburn Confluence to River Colne | 9 | 1 | 4 | 14 | 3 |
| Spen Beck from Source to River Calder | 5 | 9 | 5 | 19 | 4 |
| Holme from New Mill Dike to R Colne | 6 | 3 | 12 | 21 | 5 |
| Batley Beck from Source to River Calder | 2 | 13 | 11 | 26 | 6 |
| Clifton Beck from | 7 | 4 | 18 | 29 | 7 |

| Catchment Name | Growth rank | Historic Flood Risk rank | Predicted Flood Risk rank | Total Combined rank | Overall rank |
|---|---|---|---|---|---|
| Source to River Calder | | | | | |
| Colne from River Holme to River Calder | 13 | 12 | 6 | 31 | 8 |
| Fenay beck from Source to River Colne | 8 | 7 | 17 | 32 | 9 |
| Dearne from Source to Bentley Brook | 4 | 13 | 15 | 32 | 9 |
| Low/Wortley/Pudsey Bks | 11 | 11 | 10 | 32 | 9 |
| Colne from Wessenden Brook to R Holme | 15 | 13 | 8 | 36 | 12 |
| Don from Source to Scout Dyke | 25 | 6 | 7 | 38 | 13 |
| Tame (Source to Chew Brook) | 22 | 8 | 9 | 39 | 14 |
| Wessenden Bk from Butterly Resr to River Coln | 24 | 13 | 2 | 39 | 14 |
| New Mill Dike from Source to River Holme | 12 | 13 | 19 | 44 | 16 |
| Holme from Source to New Mill Dike | 18 | 13 | 14 | 45 | 17 |
| Dearne from Bentley Brook to Cawthorne Dyke | 16 | 13 | 16 | 45 | 17 |
| Mag Brook from Source to River Holme | 10 | 13 | 23 | 46 | 19 |
| Black Brook from Source to River Calder | 20 | 10 | 20 | 50 | 20 |
| Smithy Brook from Source to River Calder | 17 | 13 | 21 | 51 | 21 |

| Catchment Name | Growth rank | Historic Flood Risk rank | Predicted Flood Risk rank | Total Combined rank | Overall rank |
|---|---|---|---|---|---|
| Bentley Brook from Source to River Dearne | 14 | 13 | 24 | 51 | 21 |
| Booth Dean Clough from Source to River Ryburn | 27 | 13 | 13 | 53 | 23 |
| Cawthorne Dyke from Source to River Dearne | 19 | 13 | 22 | 54 | 24 |
| Scout Dyke from Source to River Don | 21 | 13 | 25 | 59 | 25 |
| Colne from Source to Wessenden Brook | 23 | 13 | 25 | 61 | 26 |
| Chew Brook | 26 | 13 | 25 | 64 | 27 |
| Crowden Great Brook | 28 | 13 | 24 | 66 | 28 |
| Heyden Brook | 28 | 13 | 24 | 66 | 28 |

A Red Amber Green (RAG) rating is then 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 to increases in flood risk and development between catchments within the study area.

Specific policies are provided for each resulting risk category. Catchment-specific planning policy considerations are identified for the catchments where cumulative development is likely to have the greatest impact on flood risk to communities. The overall analysis provides context for further appropriate consideration of catchment-scale flood risk issues.

In addition to assessment at a Strategic Flood Risk Assessment (SFRA) level, it is recommended that site-specific Flood Risk Assessments (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.

A map of the RAG rating for each catchment is shown in Figure 2-2 and a summary of the final results is shown in Table 2-6, Table 2-7 and Table 2-8.

The catchments rated as at high sensitivity to the cumulative impacts of development are:

- Chald from Source to River Calder
- Calder from River Colne to River Chald
- Calder from Ryburn Confluence to River Colne

- Spen Beck from Source to River Calder
- Holme from New Mill Dike to R Colne
- Batley Beck from Source to River Calder
- Clifton Beck from Source to River Calder

The catchments rated as medium sensitivity to the cumulative impacts of development are:

- Colne from River Holme to River Calder
- Fenay beck from Source to River Colne
- Dearne from Source to Bentley Brook
- Low/Wortley/Pudsey Bks
- Colne from Wessenden Brook to R Holme
- Don from Source to Scout Dyke
- Tame (Source to Chew Brook)
- Wessenden Bk from Butterly Resr to River Coln

The catchments rated as low sensitivity to the cumulative impacts of development are:

- New Mill Dike from Source to River Holme
- Holme from Source to New Mill Dike
- Dearne from Bentley Brook to Cawthorne Dyke
- Mag Brook from Source to River Holme
- Black Brook from Source to River Calder
- Smithy Brook from Source to River Calder
- Bentley Brook from Source to River Dearne
- Booth Dean Clough from Source to River Ryburn
- Cawthorne Dyke from Source to River Dearne
- Scout Dyke from Source to River Don
- Colne from Source to Wessenden Brook
- Chew Brook
- Crowden Great Brook
- Heyden Brook

At present, site information for High Peak is not available for inclusion in the assessment.

There was no growth or development proposed in the following catchments. These catchments have been included in the cumulative impact assessment. However, they only represent sensitivity to flood risk and not growth:

- Crowden Great Brook
- Heyden Brook

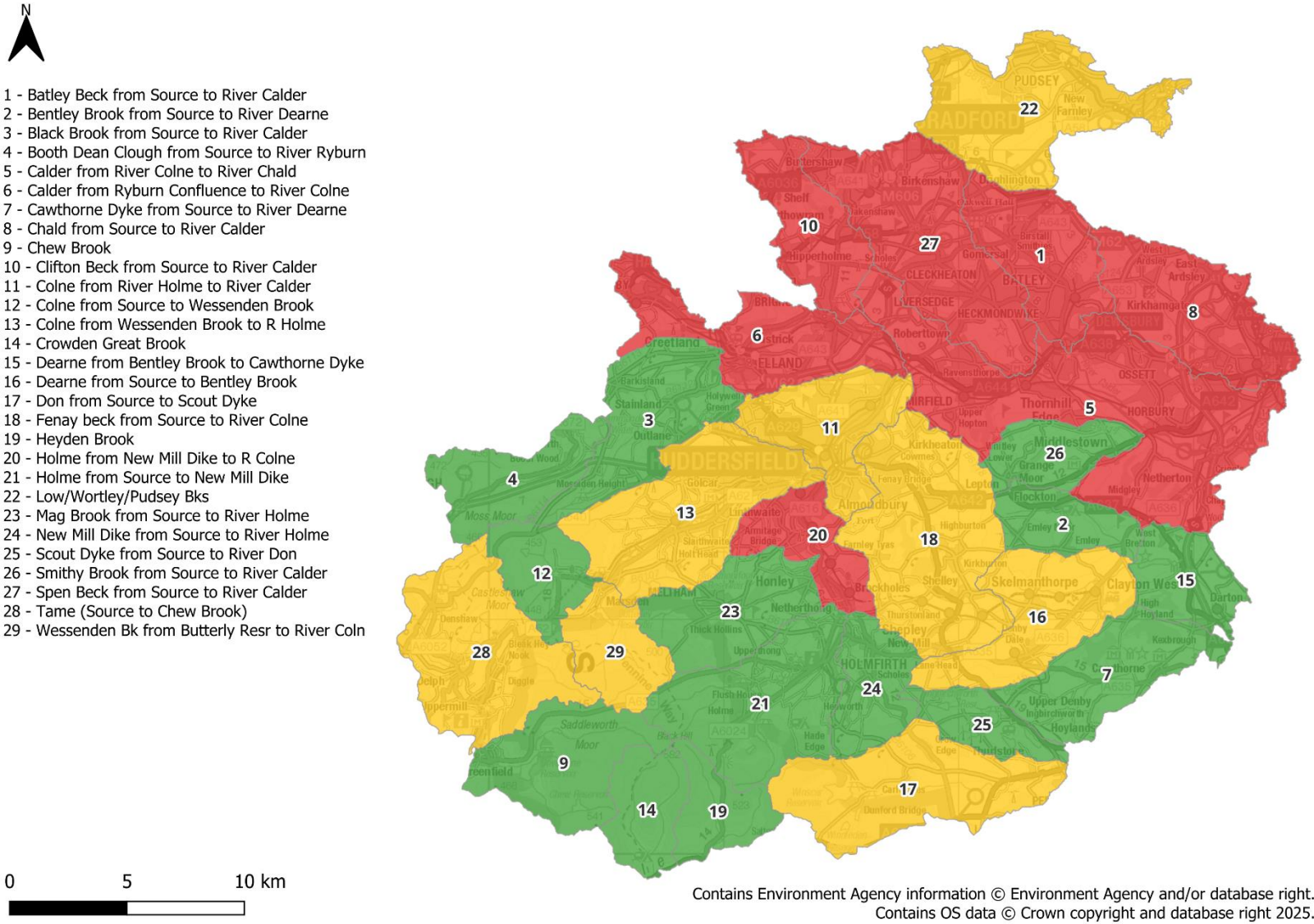



Figure 2-2: Sensitivity of catchments within and around the Kirklees study area to cumulative impacts

Table 2-6: Results of cumulative impacts assessment (High Overall Rank)

| Label | Catchment name | Drainage direction | % area of growth | Growth RAG score | Postcode points in historic flood outlines | % increase in properties at risk: 1 in 100 to 1 in 1,000-year flood extent | Flood risk RAG score | Overall RAG score | Overall rank |
|---|---|---|---|---|---|---|---|---|---|
| 8 | Chald from Source to River Calder | Southeast into Wakefield | 13.1% | High | 39 | 9.1% | High | High | 1 |
| 5 | Calder from River Colne to River Chald | East through Kirklees into Wakefield | 7.5% | High | 24 | 12.0% | High | High | 2 |
| 6 | Calder from Ryburn Confluence to River Colne | East from Calderdale into Kirklees | 5.5% | Medium | 88 | 8.5% | High | High | 3 |
| 27 | Spen Beck from Source to River Calder | Southeast from Bradford and through Kirklees | 6.2% | Medium | 7 | 7.4% | Medium | High | 4 |
| 20 | Holme from New Mill Dike to R Colne | Northeast through Kirklees | 6.1% | Medium | 7 | 5.9% | Medium | High | 5 |
| 1 | Batley Beck from Source to River Calder | South through Kirklees | 9.1% | High | 0 | 6.2% | Medium | High | 6 |

| Label | Catchment name | Drainage direction | % area of growth | Growth RAG score | Postcode points in historic flood outlines | % increase in properties at risk: 1 in 100 to 1 in 1,000-year flood extent | Flood risk RAG score | Overall RAG score | Overall rank |
|---|---|---|---|---|---|---|---|---|---|
| 10 | Clifton Beck from Source to River Calder | South through Calderdale and Bradford | 6.0% | Medium | 11 | 3.1% | Medium | High | 7 |

Table 2-7: Results of cumulative impacts assessment (Medium Overall Rank)

| Label | Catchment Name | Drainage direction | % area of growth | Growth RAG score | Postcode points in historic flood outlines | % increase in properties at risk: 1 in 100 to 1 in 1,000-year flood extent | Flood Risk RAG score | Overall RAG score | Overall rank |
|---|---|---|---|---|---|---|---|---|---|
| 11 | Colne from River Holme to River Calder | Northwest through Kirklees | 2.5% | Medium | 2 | 6.8% | Medium | Medium | 8 |
| 16 | Dearne from Source to Bentley Brook | Northeast into Wakefield | 5.6% | Medium | 5 | 3.3% | Medium | Medium | 9 |
| 18 | Fenay beck from Source to River Colne | North through Kirklees | 6.4% | Medium | 0 | 3.7% | Low | Medium | 9 |
| 22 | Low/Wortley/ Pudsey Bks | Northeast into Leeds | 3.7% | Medium | 4 | 6.2% | Medium | Medium | 9 |
| 13 | Colne from Wessenden Brook to R Holme | Northeast through Kirklees | 2.0% | Medium | 0 | 6.3% | Medium | Medium | 12 |
| 17 | Don from Source to Scout Dyke | East through Barnsley | 0.3% | Low | 1 | 6.6% | Medium | Medium | 13 |

| Label | Catchment Name | Drainage direction | % area of growth | Growth RAG score | Postcode points in historic flood outlines | % increase in properties at risk: 1 in 100 to 1 in 1,000-year flood extent | Flood Risk RAG score | Overall RAG score | Overall rank |
|---|---|---|---|---|---|---|---|---|---|
| 28 | Tame (Source to Chew Brook) | Southwest through Oldham | 0.5% | Low | 2 | 6.3% | Medium | Medium | 14 |
| 29 | Wessenden Bk from Butterly Resr to River Coln | East through Kirklees | 0.3% | Low | 0 | 9.3% | Medium | Medium | 14 |

Table 2-8: Results of cumulative impacts assessment (Low Overall Rank)

| Label | Catchment Name | Drainage direction | % area of growth | Growth RAG score | Postcode points in historic flood outlines | % increase in properties at risk: 1 in 100 to 1 in 1,000-year flood extent | Flood Risk RAG score | Overall RAG score | Overall rank |
|---|---|---|---|---|---|---|---|---|---|
| 24 | New Mill Dike from Source to River Holme | North through Kirklees | 3.2% | Medium | 0 | 2.6% | Low | Low | 16 |
| 15 | Dearne from Bentley Brook to Cawthorne Dyke | Southeast into Barnsley | 1.3% | Medium | 0 | 3.8% | Low | Low | 17 |
| 21 | Holme from Source to New Mill Dike | Northeast through Kirklees | 1.5% | Medium | 0 | 3.6% | Low | Low | 17 |
| 23 | Mag Brook from Source to River Holme | Northeast through Kirklees | 3.8% | Medium | 0 | 1.3% | Low | Low | 19 |
| 3 | Black Brook from Source to River Calder | Northeast into Calderdale | 1.1% | Medium | 1 | 2.3% | Low | Low | 20 |

| Label | Catchment Name | Drainage direction | % area of growth | Growth RAG score | Postcode points in historic flood outlines | % increase in properties at risk: 1 in 100 to 1 in 1,000-year flood extent | Flood Risk RAG score | Overall RAG score | Overall rank |
|---|---|---|---|---|---|---|---|---|---|
| 2 | Bentley Brook from Source to River Dearne | Southeast into Wakefield | 1.3% | Medium | 0 | 2.2% | Low | Low | 21 |
| 26 | Smithy Brook from Source to River Calder | East into Wakefield | 2.2% | Medium | 0 | 0.9% | Low | Low | 21 |
| 4 | Booth Dean Clough from Source to River Ryburn | North into Calderdale | 0.0% | Low | 0 | 5.9% | Low | Low | 23 |
| 7 | Cawthorne Dyke from Source to River Dearne | Northeast into Barnsley | 1.2% | Medium | 0 | 1.9% | Low | Low | 24 |
| 25 | Scout Dyke from Source to River Don | Southeast into Barnsley | 1.0% | Low | 0 | 0.0% | Low | Low | 25 |
| 12 | Colne from | East through | 0.3% | Low | 0 | 0.0% | Low | Low | 26 |

| Label | Catchment Name | Drainage direction | % area of growth | Growth RAG score | Postcode points in historic flood outlines | % increase in properties at risk: 1 in 100 to 1 in 1,000-year flood extent | Flood Risk RAG score | Overall RAG score | Overall rank |
|---|---|---|---|---|---|---|---|---|---|
| | Source to Wessenden Brook | Kirklees | | | | | | | |
| 9 | Chew Brook | West into Oldham | 0.2% | Low | 0 | 0.0% | Low | Low | 27 |
| 14 | Crowden Great Brook | South into High Peak | 0.0% | Low | 0 | 0.0% | Low | Low | 28 |
| 19 | Heyden Brook | South into High Peak | 0.0% | Low | 0 | 0.0% | Low | Low | 28 |

### 2.1.5 Planning policy considerations

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 a 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.

**1. Considerations for all developments in Kirklees**

- 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 Flood Risk Assessments 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.
- New settlement areas 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 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 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 regional storage needs at a settlement level.
    - The provision of drainage shall be based on the drainage phasing plan, to ensure adequate drainage is provided 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.
    - Kirklees Council (as LPA and LLFA) and the Environment Agency should be consulted during the development of the Surface Water Drainage Strategy.
- In upland and 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 these 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 to avoid a net loss in floodplain storage. This should be done in consultation with the Environment Agency where the development type is one that results in consultation.
- 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.

**2. Planning considerations for medium sensitivity catchments**

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 West Yorkshire Combined Authority SuDS Guidance[1]. 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.
- Developments in these areas should be incentivised to provide wider betterment by being requested to demonstrate in site specific Flood Risk Assessments 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.
- Both greenfield and brownfield developments are to aim to achieve greenfield runoff rates and volumes in their post-development state.

1 Kirklees SuDS Guidance - Kirklees Council

- Surface Water Management Plans should be developed as required.

## 3. Planning considerations for higher sensitivity catchments

All new development (other than minor extensions) in these catchments:

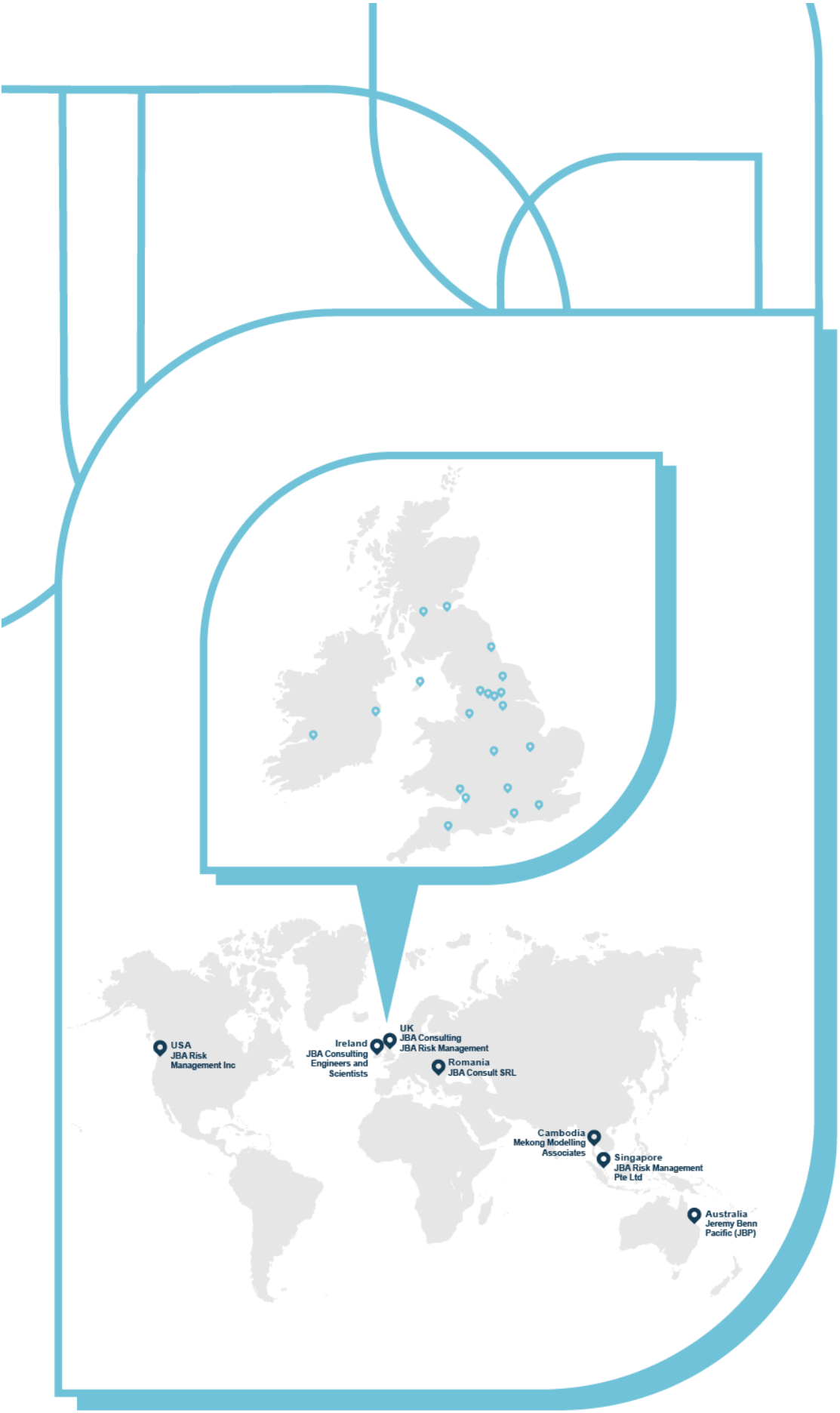
- National and local flood risk planning policy must be stringently applied within these areas, with flood risk from all sources given the appropriate priority, particularly when applying the Sequential and Exception Tests.
- Both greenfield and brownfield developments to achieve 20% betterment over pre-development greenfield runoff peak flows[2] and volumes[3] 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 Flood Risk Assessment would be required for all developments, regardless of their size.
- The Environment Agency (EA) may designate higher sensitivity catchments as Areas with Critical Drainage Problems (ACDPs) as required. If an area with critical drainage is identified, the Local Planning Authority (LPA) (supported by the Lead Local Flood Authority (LLFA)) should draft a policy within their Local Plan to manage flood risk from local sources in these catchments with critical drainage problems.
- For larger sites and strategic developments (e.g. new settlements and urban extensions):
    - The LLFA and LPA should be consulted at pre-application stage. Consultation with the Environment Agency is discretionary and subject to available resources.
    - 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 Masterplan 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.

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

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

- 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 Planning Policies on cumulative flood risk and sustainable drainage.




JBA consulting

## Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn
Associates Limited

Registered in England
3246693

JBA Group Ltd is
certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001:2018

CHAS Accredited Contractor CHAS.co.uk
IEMA
CYBER ESSENTIALS CERTIFIED
CIEEM REGISTERED
ARMED FORCES COVENANT
MEMBER OF The 5% Club