Appendix F - Cumulative Impact Assessment

1 Background

1.1 Introduction

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

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

When allocating land for development, consideration should be given to the potential cumulative impact of the loss of floodplain storage volume. Whilst the loss of storage for individual developments may only have minimal impact on flood risk, the cumulative effect of multiple developments may be more severe.

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

The cumulative impact of development should be considered at both the Local Plan making and the planning application and development design stages. Appropriate mitigation measures should be undertaken to ensure flood risk is not exacerbated, and where possible the development should be used to reduce existing flood risk issues.

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

1.2 Strategic flood risk solutions

1.2.1 Local solutions

Breckland District Council are reviewing and updating their current local plan, adopted in 2019, through a process known as the Local Plan Update (LPU). This will set an updated planning policy framework for the future management of flood risk and drainage in the area. This includes flood risk management, alongside wider environmental and water quality enhancements. Strategic solutions that the LPU may directly or indirectly help to shape include upstream flood storage, integrated major infrastructure/ flood risk management schemes, new defences, and watercourse improvements as part of regeneration and enhancing green infrastructure, with opportunities for Natural Flood Management (NFM) and retrofitting Sustainable Drainage Systems (SuDS).

Existing actions relevant to Breckland District are set out in the Norfolk Local Flood Risk Management Strategy (LFRMS). The LFRMS aims to set out how flood risk will be reduced and managed across the County.

The relevant River Basin District (RBD) Flood Risk Management Plan (FRMP) also sets out local measures relevant to Breckland District. Breckland District falls within the Anglian RBD. Measures set out within the Anglian RBD FRMP that are applicable to Breckland District include:

- Consider the outputs of Broadland Futures Initiative in the Broadland Area.
- Work with Natural England, the Broads Authority, Broadland Catchment Partnership, the RSPB, and the Farming and Wildlife Advisory Group in the Broadland area.
- Work with Norfolk Rivers Trust, River Waveney Trust, water companies, landowners, Norfolk County Council, and Internal Drainage Boards (IDBs) (amongst others) in the Broadland Rivers Management Catchment.
- Work with landowners and a range of organisations in the Broadland Rivers Management Catchment.
- Work with other organisations to develop a long term strategy in the Broadland area.
- Work with partners to deliver a variety of integrated flood risk and wider benefits when looking at natural flood management measures in the River Cam and its tributaries.

There are also some measures applicable to specific areas within Breckland District:

- Continue to investigate and, if viable, progress NFM schemes in Besthorpe, Ovington, and Saham and Toney.
- Continue to investigate and, if viable, progress surface water flood risk management schemes in Crimplesham, Watton, and Thetford.

The Environment Agency (EA) Explorer Map provides further information on regional and national measures set out as part of the FRMPs.

Further details on strategic plans that exist for Breckland District can be found in Section 2 of the Main Report.

1.2.2 National solutions

The EA is developing a new National Flood Risk Assessment (NaFRA2) which is expected to be published in 2024 and will provide a wide range of new data to assess flood risk from rivers, the sea, and surface water. This new assessment will provide an improved evidence base from which to inform our management of risk. However, this will only provide a starting point in the assessment and mitigation of cumulative risk.

Flood risk is likely to increase, perhaps substantially, as a result of climate change so planners, emergency planners, asset managers, and others will need to mitigate this through a mix of collaborative working, planning policies, consideration of 'worst case' scenarios, development of contingency plans, and some detailed analysis.

1.2.3 Opportunities and projects in and/or affecting Breckland District

The following sections address partnerships and project delivery schemes that affect the study area. Section 6.6 of the Main Report highlights specific Natural Flood Management schemes in progress or proposed within Breckland District. Developers should consult Norfolk County Council for more details of NFM schemes within Breckland and to identify opportunities for development to support NFM initiatives.

1.2.3.1 Catchment Based Approach (CaBA)

The Catchment Based Approach (CaBA) was introduced by the Government to establish catchment partnerships throughout England to jointly deliver improved water quality and reduce flood risk, directly supporting achievement of many of the targets set out within the Government's 25-year Environment Plan. CaBA partnerships are actively working in all 100+ river catchments across England and cross-border with Wales. Further details are available on the CaBA website.

The Broadland Catchment Partnership covers the east side of the study area, which is co-hosted by the Broads Authority and Norfolk Rivers Trust. Initiatives that the Broadland Catchment Partnership are promoting include Rural Sustainable Drainage, Water Sensitive Farming, and NFM. Actions that the Broadland Catchment Partnership are working to meet are set out in the Broadland Rivers Catchment Plan.

1.2.3.2 Norfolk Wildlife Trust

Norfolk Wildlife Trust manage 15 nature reserves within Breckland. These are:

- **Narborough Railway Line** - a disused railway embankment which contains a rare habitat-type for Norfolk, chalk grassland, supporting pyramidal and early purple orchids, marsh helleborine, and autumn gentian.

- **Honeypot Wood** - a remnant of wild wood dating back to the retreat of the last ice age, home to the greater butterfly orchid.
- **Hoe Rough and Beetly Meadows** - mixture of grassland, heath, and fen habitats, home of the great crested newt.
- **Rushmeadows** - contains species rich fen habitats with extensive areas of wet alder woodland, supporting wetland specialist plants such as bogbean, marsh orchid, and tubular dropwort.
- **Scarning Fen** - home to a number of rare species, including liverworts, mosses, and several plant. Also, supports numerous species of invertebrates, with 29 nationally scare species recorded at the reserve.
- **Lolly Moor** - supports a diverse range of habitat and flora, including lesser celandine, primrose, fragrant orchid, southern marsh orchid, marsh helleborine, and twayblade.
- **New Buckenham Common** - a large area of cattle-grazed grassland and scrub. The largest pool, known as Spittle Mere, is a good habitat for great crested newts.
- **Swangey Fen** - open fen supporting numerous fen plants including milk parsley, bog pimpernel, saw-sedge, and adder's tongue. Some otters are present at the site.
- **East Wretham Heath** - open heath habitat home to may rare species of plant and insect as well as scarce breeding birds including woodlark, redstart, and stone curlews. Also, contains a number of meres which support numerous waterbirds.
- **Thompson Common** - contains pingos, a series of around 400 post-glacial shallow, fluctuating pools which harbour a variety of flora and fauna. The site is nationally important for dragonflies and damselflies.
- **Wayland Wood** - ancient woodland which includes a mix of tree species and supports a wide range of flora and fauna. Key habitat for moths, with over 250 species recorded.
- **Cranberry Rough** - area of wet woodland and fen which supports a range of bird species, including teal and mallard.
- **Weeting Heath** - nationally important site to find stone curlew as well as supporting a wide range of additional bird species, including woodlarks, green woodpeckers, lapwings, and mistle thrushes.
- **Sparham Pools** - former gravel workings which support a variety of ducks, including shoveler, gadwell, mallard, pochard, and tufted duck.
- **Foxley Wood** - woodland area which supports a variety of woodland plants and wildflowers, with over 350 flowering plant species recorded.

NFM techniques could be encouraged at some of the reserves to aid flood storage and improve natural habitats.

1.3 Assessment of Cross-Boundary Issues

The study area is bordered by North Norfolk District to the north, Broadland and South Norfolk Districts to the east, Mid Suffolk and West Suffolk Districts to the south, and King's Lynn and West Norfolk District to the west. The neighbouring authorities are shown in Figure 1-1.

The highest elevations in Breckland District are within the north and central areas of the District, with lower elevations in the south of the District and along the eastern and western boundaries. The location and underlying topography of the District means there are cross-boundary watercourses shared with neighbouring authorities in all directions, some originating within the District and some entering the District from the neighbouring authorities.

The River Wensum enters the District from Kings Lynn District, flowing through the northeast of the District and then into Broadland District. Its main tributary within the District, the Blackwater, drains the northeast of the District. The River Tud flows out of the area in an easterly direction, joining the River Wensum within Broadland District. Blackwater River also flows out of the area in an easterly direction to join the River Yare in South Norfolk District. The watercourses draining the north and eastern areas of the District all eventually converge into the River Yare, on the east side of Norwich, which flows along the border between Broadland District and South Norfolk District and then through Great Yarmouth District before entering the North Sea at Gorleston-on-Sea.

The River Waveney has its source along the southern border of the District, forming the boundary between Breckland District and Mid Suffolk District as it flows in an easterly direction. It then continues to form the border between South Norfolk District and Mid Suffolk and East Suffolk Districts before joining the River Yare in Great Yarmouth District.

The River Wissey and its tributaries drain the west side of the District, flowing in a westerly direction to join the River Great Ouse, which flows in a northerly direction through King's Lynn and West Norfolk District, entering the North Sea to the north of King's Lynn. The Little Ouse enters the District from West Suffolk District to the south and flows in a north-westerly direction through the southwest of the District, with its tributaries draining the south of the District. The Little Ouse also eventually joins the River Great Ouse.

Section 1.5 of the Main Report provides further details on the study area.

Future development, both within and outside of the study area, as well as climate change, have the potential to affect flood risk to existing development and the surrounding areas through increased runoff, depending on the effectiveness of SuDS and drainage implementation.

Development management should ensure that the impact on receiving watercourses from development has been sufficiently considered during the planning stage. The NPPF sets out how developments should demonstrate they will not increase flood risk elsewhere. Therefore, providing developments near watercourses in neighbouring authorities comply with the latest planning policy, guidance, and legislation relating to flood risk and sustainable drainage, they should result in no increase in flood risk within the study area.

The neighbouring authorities were contacted for information on their site allocations, to determine where development in neighbouring authorities may have an impact on Breckland. The following Local Plans have been adopted by the neighbouring local authorities and include policies relevant to flood risk and drainage, with hyperlinks to the documents provided:

- The draft local plan for North Norfolk District will guide development decisions until at least 2036. The plan is currently undergoing independent examination.
- Babergh and Mid Suffolk Joint Local Plan Part 1 (2018 - 2037) adopted in November 2023. This is due to be followed by a Part 2 Plan.
- West Suffolk Council are currently reviewing their local plan, with further information available on the Council website. The existing West Suffolk Local Plan (consisting of the former Forest Heath and St Edmundsbury areas) documents are available on the West Suffolk Council website.
- Kings Lynn and West Norfolk District Local Plan review 2016-2036, which is currently going through examination. The existing local plan is currently made up of the Core Strategy (adopted in 2011) and the Site Allocations and Development Management Policies Plan (adopted in 2016).
- Broadland District Council and South Norfolk Council are working with Norwich City Council and Norfolk County Council to prepare the Greater Norwich Local Plan, for the plan period up to 2038. The proposed adoption of the Plan by Broadland District Council is currently being considered.

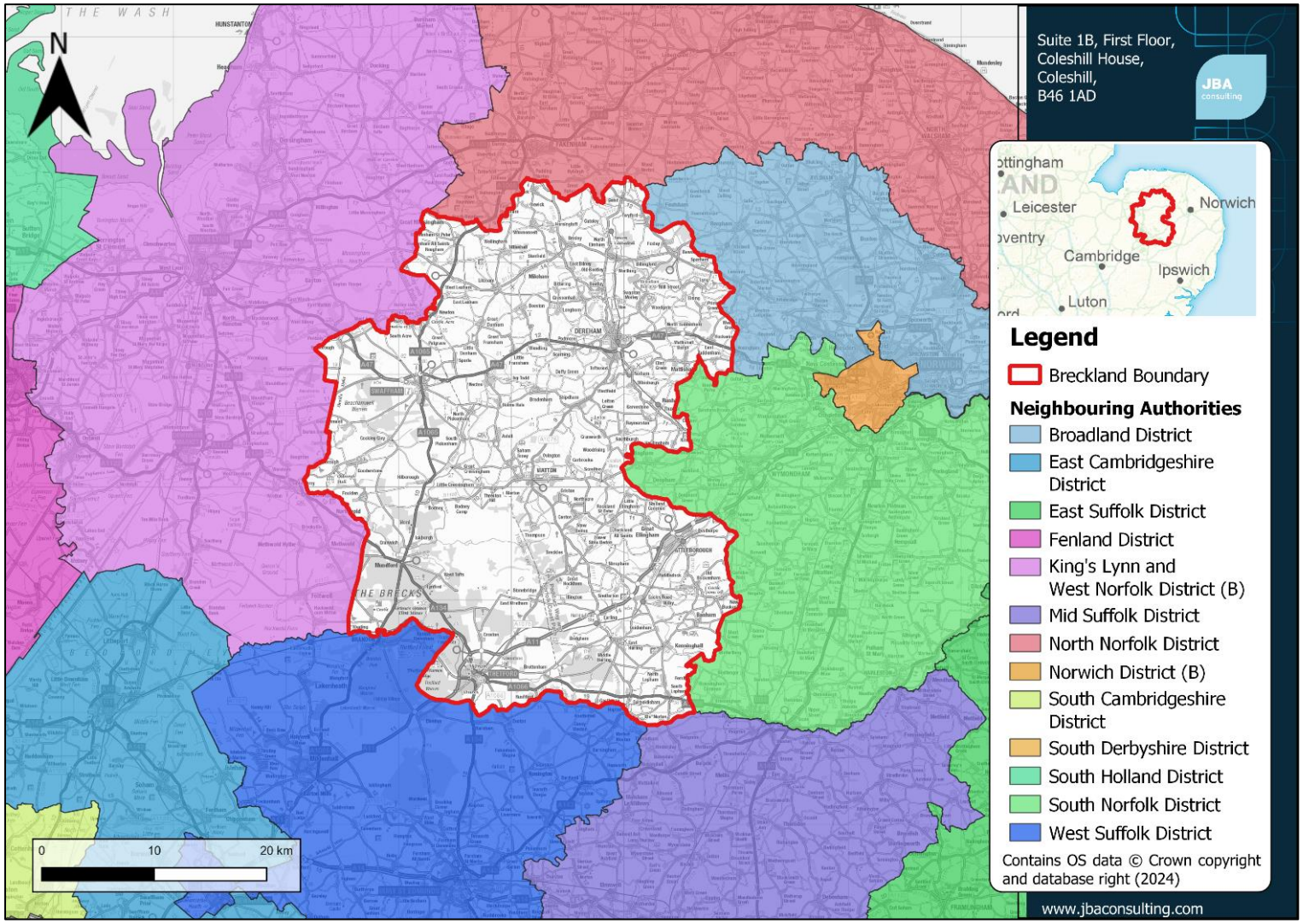


Figure 1-1: Neighbouring authorities to Breckland District.

1.4 Cumulative Impact Assessment Methodology

For the Cumulative Impact Assessment (CIA), Breckland District was assessed at a catchment level using the Water Framework Directive (WFD) catchments, with these catchments shown in Figure 1-2. There are a total of 38 WFD catchments which fall within the district to some extent, however, eight of these have less than 5% of their area within the district, and are not areas with proposed allocations within Breckland, so these were therefore removed from the assessment:

- Hopton Brook
- Tat
- Tas (Head to Tasburgh)
- Country Drain
- Frenze Beck
- Tiffey (u/s Wymondham STW)
- Little Ouse (US Thelnetham)
- Stringside Stream

There are four stages to the Level 1 CIA:

1. Assess sensitivity to fluvial and surface water flood risk.
    - This will be assessed by calculating the change in the number of properties at risk from the 1% AEP to the 0.1% AEP events for fluvial and surface water flooding respectively, given as a percentage of the total properties in the catchment.
2. Identify historic flooding incidents.
    - Identify the total number of historic flooding incidents within each catchment.
3. Assess the catchments with the highest degree of proposed new development.
    - This will be assessed by calculating the percentage area of each catchment covered by proposed development. This assessment will be run for each of the three strategic site Housing Options, as detailed in Section 1.4.3.
4. Identify the catchments at greatest risk.
    - Rank catchments in each category.
    - Discussion of catchments which are at high risk in all categories/individual categories.
    - Policy recommendations for developments in higher risk catchments.
    - Identify catchments needing further consideration within a Level 2 SFRA (if required).

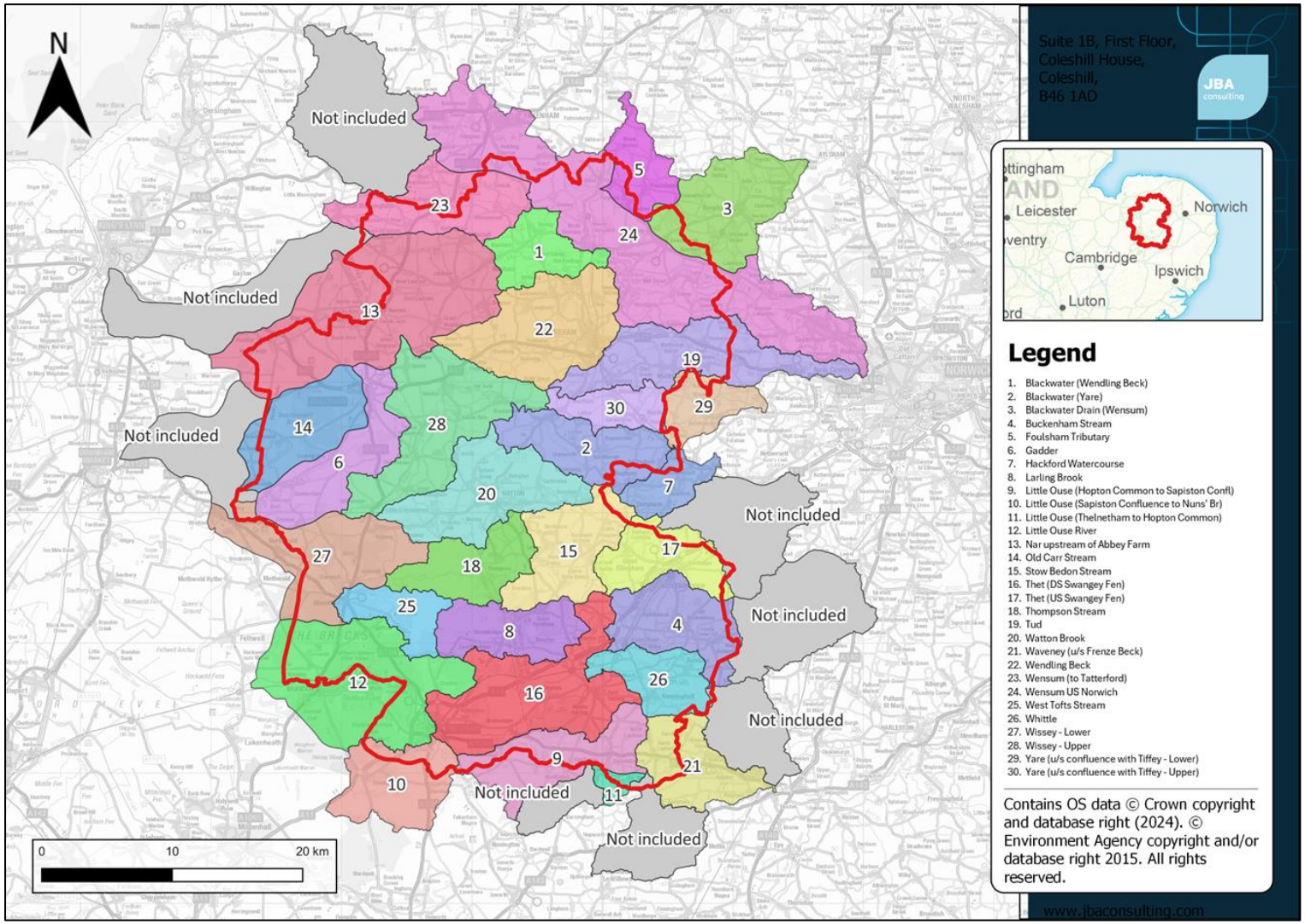


Figure 1-2: WFD Catchments across Breckland District.

Table 1-1 summarises the datasets used within the Breckland CIA.

Catchments within the study area were ranked on four metrics: sensitivity to increased fluvial flood risk, sensitivity to increased risk of surface water flooding, prevalence of recorded historic flood incidents (limited by the data available), and area of new development proposed within the catchment. Three development scenarios are currently being considered by Breckland District, so the assessment was run for each of the Housing Options. These are detailed in Section 1.4.3.

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

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

Dataset	Coverage	Sources of Data	Use of Data
Catchment boundaries	Breckland and neighbouring authorities	Water Framework Directive Catchments	Assessment of susceptibility to cumulative impacts of development by catchment
National Receptor Dataset (2021)	Breckland District (does not extend across all cross-boundary catchments)	EA	Properties for the assessment of flood risk
Risk of Flooding from Surface Water	Breckland and neighbouring authorities	EA	Assessing the number of properties at risk of surface water flooding within each catchment
Fluvial Flood Zones 2 and 3a	Breckland and neighbouring authorities	EA Flood Map for Planning	Assessing the number of properties at risk of fluvial flooding within each catchment
Future development areas (proposed residential and employment sites and three potential strategic site Housing Options currently being considered)	Breckland District	Breckland District Council	Assessing the impact of proposed future development on risk of flooding

Dataset	Coverage	Sources of Data	Use of Data
Future development areas (proposed allocations)	North Norfolk District	North Norfolk District Council	Assessing the impact of proposed future development on risk of flooding
Historic flooding incidents	Breckland Mid Suffolk and West Suffolk	Norfolk County Council Suffolk County Council	Assessing incidences of historic flooding within the study area

1.4.1 Sensitivity to increases in fluvial flooding

This is the measure of the increase in the number of properties at risk of fluvial flooding from the 1% AEP event to the 0.1% AEP event (based on Flood Map for Planning Flood Zones 3 and 2 respectively). It is an indicator of where local topography makes an area more sensitive to increases in flood risk that may be due to any number of reasons, including climate change, new development etc. It is not an absolute figure or prediction of the impact that new development will have on flood risk.

The National Receptor Database (NRD) dataset 2021 was used to identify all properties within the catchments. The NRD was filtered so that only residential and non-residential properties were included within the analysis, excluding other services and features represented within the NRD. The NRD provided by the Council covers the full extent of Breckland District with a small buffer. However, it does not cover all cross-boundary catchments as this data is not held by the Councils.

The main catchments affected are:

- Wensum US Norwich
- Tud
- Blackwater Drain (Wensum)

The main areas impacted for the Wensum US Norwich and the Tud catchments is the eastern ends of the catchments towards Norwich. The NRD covers most of these catchments but the urban areas in the east are excluded which could impact the assessment of risk. Where development is proposed within these areas, developers will need to demonstrate through a site specific flood-risk assessment that there will be no adverse impact on flood risk downstream.

The northern end of the Tud catchment is included from the NRD coverage, however, this area is predominantly rural with the only considerable built up area excluded being Cawston, therefore the impact of this missing data is likely to be minimal.

The NRD was intersected with the 1% and 0.1% AEP fluvial flood extents separately to determine the number of properties in each catchment, in each 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 Sensitivity to increases in surface water flooding

This is the measure of the increase in the number of properties at risk of surface water flooding in a 1% AEP event to a 0.1% AEP event (based on the Environment Agency's Risk of Flooding from Surface Water dataset) and follows the same process as for fluvial flood risk, see Section 1.4.1 above.

1.4.3 Growth in the area

Areas for future proposed development were received from Breckland District Council. At the time of this assessment, alongside proposed housing and employment allocations from their Call for Sites, the Council are considering three strategic Housing Options, set out in Table 1-2 below and shown in Figure 1-3.

The area of new development, including all proposed housing and employment allocations earmarked by the Council, within each catchment was calculated for each of the strategic housing options. The area of new development was expressed as a percentage of the total catchment area to determine the potential for increases in flood risk as a result of new development. At this stage the whole area of each development was considered, with no land use assumptions for the development areas.

Proposed development allocations for the neighbouring authorities were not included in this assessment, as data was only available for North Norfolk. This is discussed further in Section **Error! Reference source not found.**.

Table 1-2: Summary of three development scenarios proposed by Breckland District Council.

Option	Name	Plan ref	Dwellings
Housing Option A (two sites)	South West Urban Extension between A1075 Shipdham Road The Broadway and A47 Trunk Road and East Draytonhall Lane	LPRC4SDEV174 and LPRC4SDEV368	1400 and 500
Housing Option B (one site)	Robertson Barracks, Worthing Road	LPR/C4S/DEV/010	2000
Housing Option C (one site)	Barkers Farm, Roudham & Larling	LPRC4SDEV388	1900

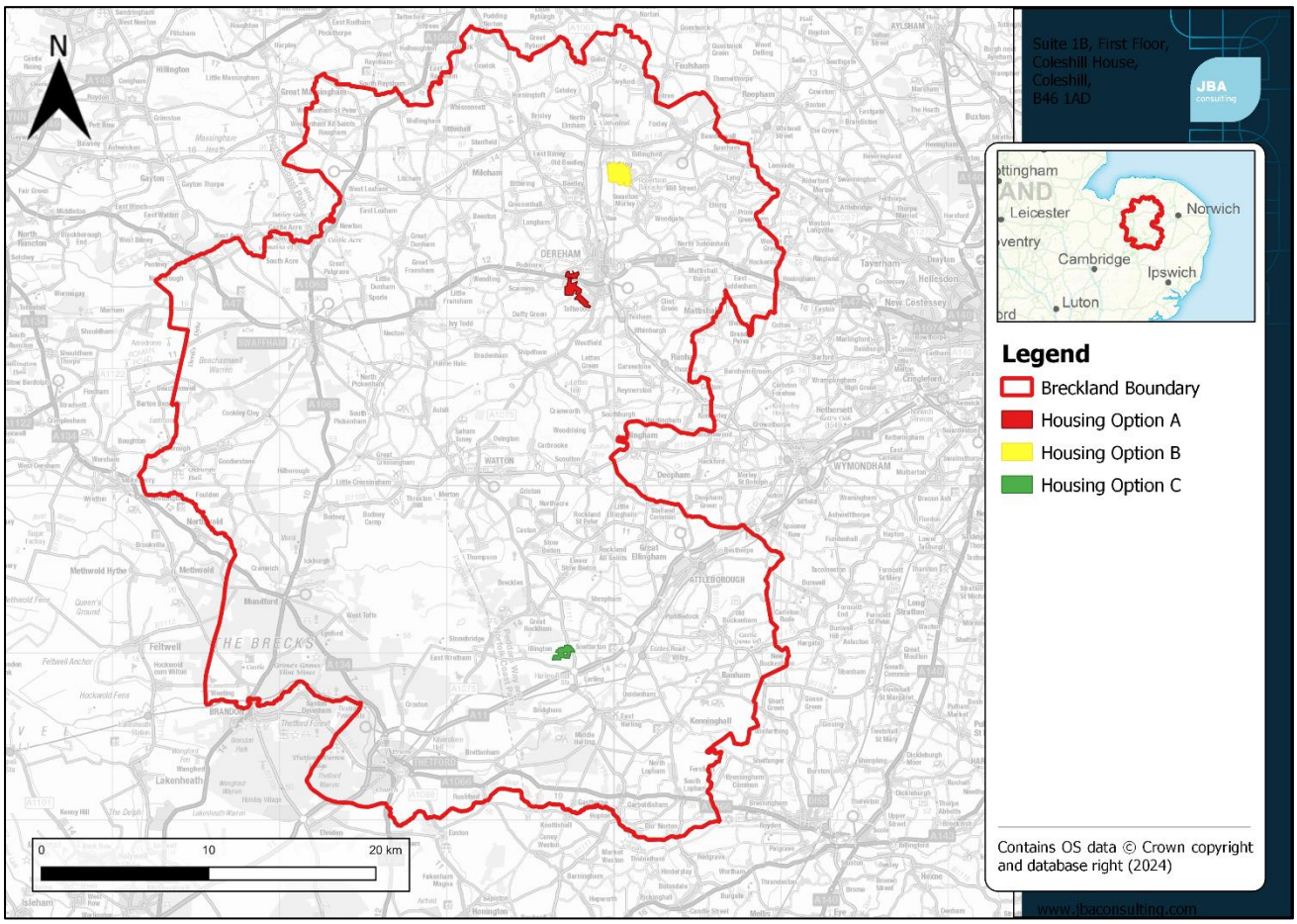


Figure 1-3: Locations of the three proposed housing development allocations within Breckland District.

1.4.4 Historic flood risk

Recorded flooding event data for both internal and external flooding events was provided by Norfolk County Council for Breckland District for this assessment. Suffolk County Council also provided historic flooding data for Mid Suffolk and West Suffolk Districts. No historic flooding data was made available for the other neighbouring authorities. Therefore, historic events in catchments that cross these local authorities' boundaries are unknown.

Details of historic flood events can be found in Section 5.1 of the main report. The historic data was represented as point data, where each point represents a location where it is known there has been at least one flood event (however, the nature and scale of these flood events varies significantly). Historic data was also provided by the IDBs (East Hardling and Norfolk Rivers) in the district; however, this was not available in a GIS format so could not be included within the assessment. As none of the proposed Housing Options lie within an IDB area this has not been discussed further.

A count of each historical flood incident was conducted for each catchment to determine the historic flood risk within the catchments. Where over 50% of the catchment lies outside Breckland District and Mid Suffolk and West Suffolk Districts, where historic flooding data

was not available, the historic assessment result was not included in calculating the overall ranking for the catchment. The historic assessment was therefore excluded from the following catchments:

- Hackford Watercourse
- Yare (u/s confluence with Tiffey - Lower)
- Blackwater Drain (Wensum)
- Foulsham Tributary
- Wensum US Norwich

1.4.5 Ranking the results

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

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

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

Table 1-3: Ranking assessment criteria

Flood risk ranking	Percentage of properties at increased risk of fluvial flooding	Percentage of properties at increased risk of surface water flooding	Total number of historic flooding incidents	Percentage area of catchment covered by new development
Low risk	<0.6	<2.6	<20	<1
Medium risk	0.6 to 1	2.6 to 4	20-60	>1, <2
High risk	>1	>4	>60	>2

1.4.6 Assumptions

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

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

Table 1-4: Assumptions of the CIA.

Assessment aspect	Assumption made	Details of limitation in method	Justification of method used
Surface water flood risk; Flood Zone 2 and 3a	Total number of properties	Assumption that all properties have been included in the 2021 NRD dataset. It may not include all new build properties. It also does not include all properties across some of the larger cross-boundary catchments.	This was the most up to date and accurate data available.
Fluvial flood risk	Climate change proxy	Used the Flood Map for Planning Flood Zone 2 as an indicative estimate of the impacts of climate change across the district.	Although detailed climate change modelling was available for some watercourses, the broader Flood Map for Planning covers the entire area of the catchments both within and outside the district and therefore provided a consistent approach for this high level assessment.
Historic Flooding incidents	Total number of historic events and severity of flooding	Only flooding incidents recorded that could be georeferenced with XY coordinates to produce GIS files were used. Each point represents a location where it is known there has been at least one flood incident. The severity of the historic flooding event relating to the point has not been considered, just the total number of points within each catchment where there has been a flood	GIS data sourced provided the most accurate results possible for the location of historic flooding incidents across the district.

Assessment aspect	Assumption made	Details of limitation in method	Justification of method used
		incident.	
Historic Flooding incidents	Coverage	Historic data provided by Norfolk and Suffolk County Councils only covered Breckland, Mid Suffolk, and West Suffolk Districts and therefore does not provide data across some of the larger cross-boundary catchments.	Best available historic data has been used. To reduce any impacts of the limited data coverage, for catchments where greater than 50% of their area lies outside Districts where historical data was available, the historic assessment was not included within the overall ranking as the count is likely to be a considerable underestimate for these catchments.
Development	Area of development	Assumed that the whole site area will be developed. Development for neighbouring authorities was not included in the assessment as data was only available for North Norfolk.	Information on site layout not available at this time so this assumes a worst-case scenario. Opportunities for brownfield and greenfield sites are discussed for high risk catchments. There is limited development proposed in cross-boundary catchments so exclusion of development sites in neighbouring authorities will have a minimal impact.

1.5 Cumulative Impact Assessment

1.5.1 Sensitivity to fluvial flooding

The number of properties located within Flood Zone 2, but not presently within Flood Zone 3a was calculated, as a percentage of the total properties across the whole catchment. These properties are considered sensitive to increased flood risk as a result of climate

change. Flood Zone 2 can be used as an indicative climate change extent given the upper end climate change estimates are often similar to the 0.1% AEP/ Flood Zone 2 extents.

The fluvial flood risk is shown to be generally low across the district. Catchments with greater than 1% of properties at increased risk were considered to be the most sensitive and are listed in Table 1-5 below.

Table 1-5: Catchments considered highly sensitive to increased fluvial flood risk in the future.

Catchment	Percentage of properties sensitive to increased fluvial flood risk	Rank
Wensum US Norwich	1.8%	1
Little Ouse River	1.5%	2
Stow Bedon Stream	1.3%	3

1.5.2 Sensitivity to surface water flooding

The number of properties located within the 0.1% AEP surface water extent not presently within the 1% AEP extent was calculated, as a percentage of the total properties across the whole catchment. These properties are considered sensitive to increased flood risk as a result of climate change.

Catchments with greater than 4% properties at increased risk were considered to be the most sensitive and are listed in Table 1-6.

Table 1-6: Catchments considered highly sensitive to increased surface water flood risk in the future.

Catchment	Percentage of properties sensitive to increased surface water flood risk	Rank
Hackford Watercourse	6.4%	1
Blackwater (Wendling Beck)	5.2%	2
Whittle	5.1%	3
Thet (US Swangey Fen)	4.5%	4

1.5.3 Prevalence of historic flooding incidents

Historic flood incidents data were provided by Norfolk County Council for Breckland District and Suffolk County Council for Mid Suffolk and West Suffolk Districts in December 2023. While this will not provide a detailed scope of historic flooding incidents across the region from neighbouring authorities, using the data available the number of flood incidents in each catchment were identified to provide a broadscale understanding of flood risk. These records do not distinguish between sources of flooding, and it is noted that not all flooding is

reported to/recorded by the relevant LLFA. This is particularly the case in rural areas such as Breckland, where many of the areas at flood risk are unpopulated. As such this assessment will predominantly highlight catchments with communities at risk of flooding. This is however preferable, as it highlights where development has the potential to increase flood risk to existing communities. Where more than 50% of the catchment lies outside the Districts with available historic data, the historic assessment was not included within the final ranking calculations.

Catchments with more than 60 recorded flooding incidents were considered high risk and are listed in Table 1-8.

For a more detailed assessment of historic flood risk, acquiring historic flooding incidents records from all neighbouring authorities is recommended.

Table 1-7: Catchments with the highest number of recorded historic flood incidents.

Catchment	Number of recorded incidents	Rank
Watton Brook	279	1
Wendling Beck	186	2
Little Ouse River	186	2
Waveney (u/s Frenze Beck)	115	4
Thet (US Swangey Fen)	97	5

1.5.4 Area of proposed development

Breckland District Council provided their Call for Sites with their earmarked development sites for housing and employment alongside three proposed strategic Housing Options which are detailed in Section 1.4.3. The assessment was run for each of the Housing options. Due to the scale of proposed developments in comparison to the catchment areas, catchments with more than 2% of their area earmarked for development were considered at highest risk. The high risk catchments for each development option are listed in Table 1-8

Table 1-8: Catchments with the highest percentage cover of proposed development for each development option.

Catchment	Development option	Area of proposed development (ha)	Area of proposed development as percentage of catchment area
Thet (DS Swangey Fen)	Option A	362.0	3.9%
Yare (u/s confluence with Tiffey - Upper)	Option A	67.5	2.8%
Wendling Beck	Option A	112.0	1.2%
Tud	Option A	74.9	1.1%

Catchment	Development option	Area of proposed development (ha)	Area of proposed development as percentage of catchment area
Thet (DS Swangey Fen)	Option B	362.0	3.9%
Yare (u/s confluence with Tiffey - Upper)	Option B	67.5	2.8%
Wendling Beck	Option B	201.0	1.1%
Blackwater (Wendling Beck)	Option B	35.3	1.1%
Thet (DS Swangey Fen)	Option C	365.3	4.0%
Yare (u/s confluence with Tiffey - Upper)	Option C	67.5	2.8%
Larling Brook	Option C	62.5	1.5%

1.6 Overall rankings

For each assessment, catchments were given a score of 3 (high), 2 (medium), or 1 (low) sensitivity to increased flood risk, excluding the historic data assessment where sufficient information was not available. It should be noted that this is a comparative assessment, and risk across the District is generally low. These scores were then averaged across the assessment to give a combined score.

A Red-Amber-Green (RAG) rating was then applied to the catchments, with red being high sensitivity, amber being medium sensitivity, and green being low sensitivity. The catchments with an average score of greater than or equal to 2 were deemed high risk. The average scores and RAG ratings were applied separately for each of the three development scenarios.

The results of the RAG assessments are shown in Figure 1-4 (Option A), Figure 1-5 (Option B), and Figure 1-6 (Option C). The high sensitivity catchments for each development scenario are discussed in Section 1.6.1 below.

1.6.1 High risk catchments

There are three catchments shown to be highly sensitive across all development scenarios:

- **Little Ouse River.** This catchment ranked as high risk for historic flooding and is shown to be highly sensitive to increases in fluvial flood risk. This catchment is located in the southwest of the district, and lies across Breckland District, West Norfolk District, and King's Lynn and West Suffolk District. It covers the settlement of Brandon where there are a considerable number of recorded

historic flooding incidences, although these mostly lie outside of Breckland District.

- **Thet (DS Swangey Fen).** This catchment ranked as medium risk for historic flooding and increased fluvial flood risk and high risk for proposed development within the catchment. This catchment is located in the south of the district and covers the eastern part of Thetford, where there are several recorded historic flooding incidences.
- **Thet (US Swangey Fen)**. This catchment ranked as high risk for historic flooding and is shown to be highly sensitive to increases in surface water flood risk. This catchment is located in the east side of the district and covers the northern part of Attleborough, where most of the recorded historic flooding incidences are concentrated.

1.6.1.1 Housing Option A

There are no additional highly sensitive catchment identified in Housing Option A, however most of the proposed strategic development site lies within the **Wendling Beck** catchment which is identified as being at high risk due to the number of recorded historic flooding incidents.

1.6.1.2 Housing Option B

There are two additional highly sensitive catchments identified in Housing Option B: **Wendling Beck**, and **Blackwater (Wendling Beck)**. Some of the proposed strategic development also falls within the **Wensum US Norwic**h catchment.

Most of the proposed development lies within Wendling Beck, which as discussed above is identified to be at high sensitivity as a result of historic flooding. The remainder of the development falls within Wensum US Norwich, which is identified as being highly sensitive to increases in fluvial flood risk, and Blackwater (Wendling Beck), which is identified as being highly sensitive to increases in surface water flood risk and of medium sensitivity to increases in fluvial flood risk.

1.6.1.3 Development Option C

No additional high risk catchments are identified in Option C. The majority of the proposed development falls within the **Larling Brook** catchment, which was ranked as low sensitivity across all other categories. The remainder of the development falls within the **Thet (DS Swangey Fen)** catchment, which ranked as high sensitivity for development across all scenarios, medium sensitivity for the historic, and fluvial assessments, and low sensitivity for surface water risk.

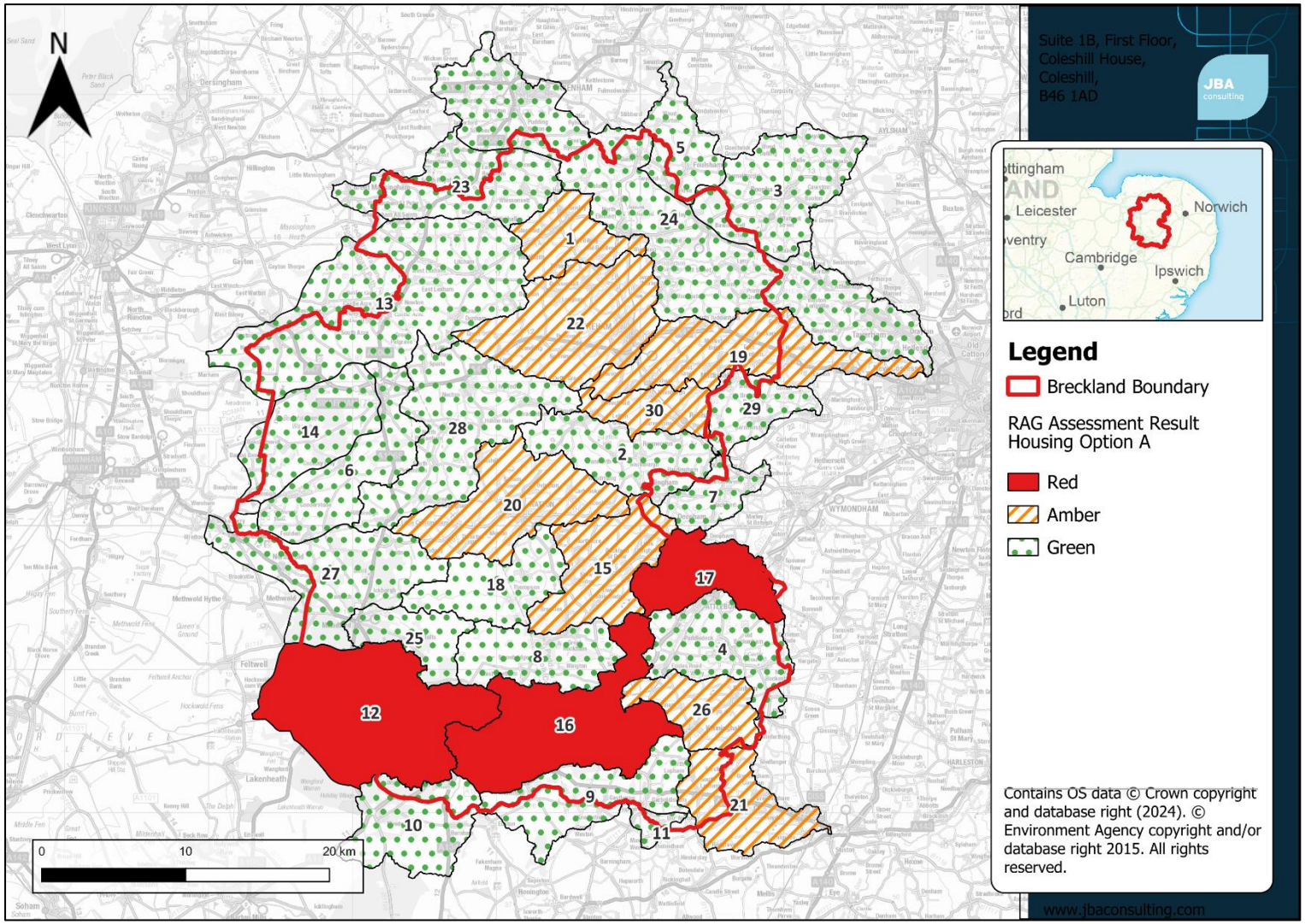


Figure 1-4: Results of the RAG assessment for Housing Option A.

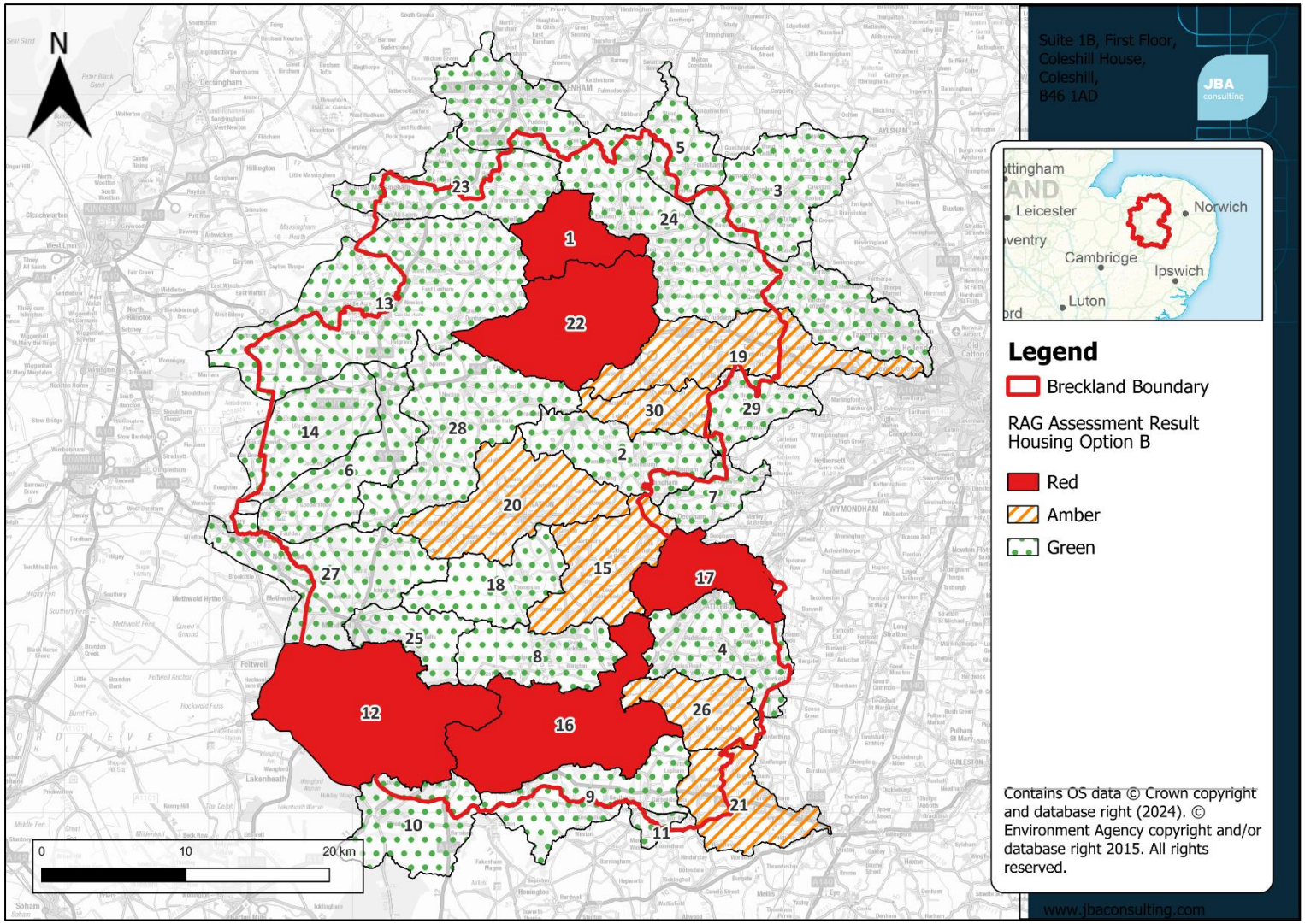


Figure 1-5: Results of the RAG assessment for Housing Option B.

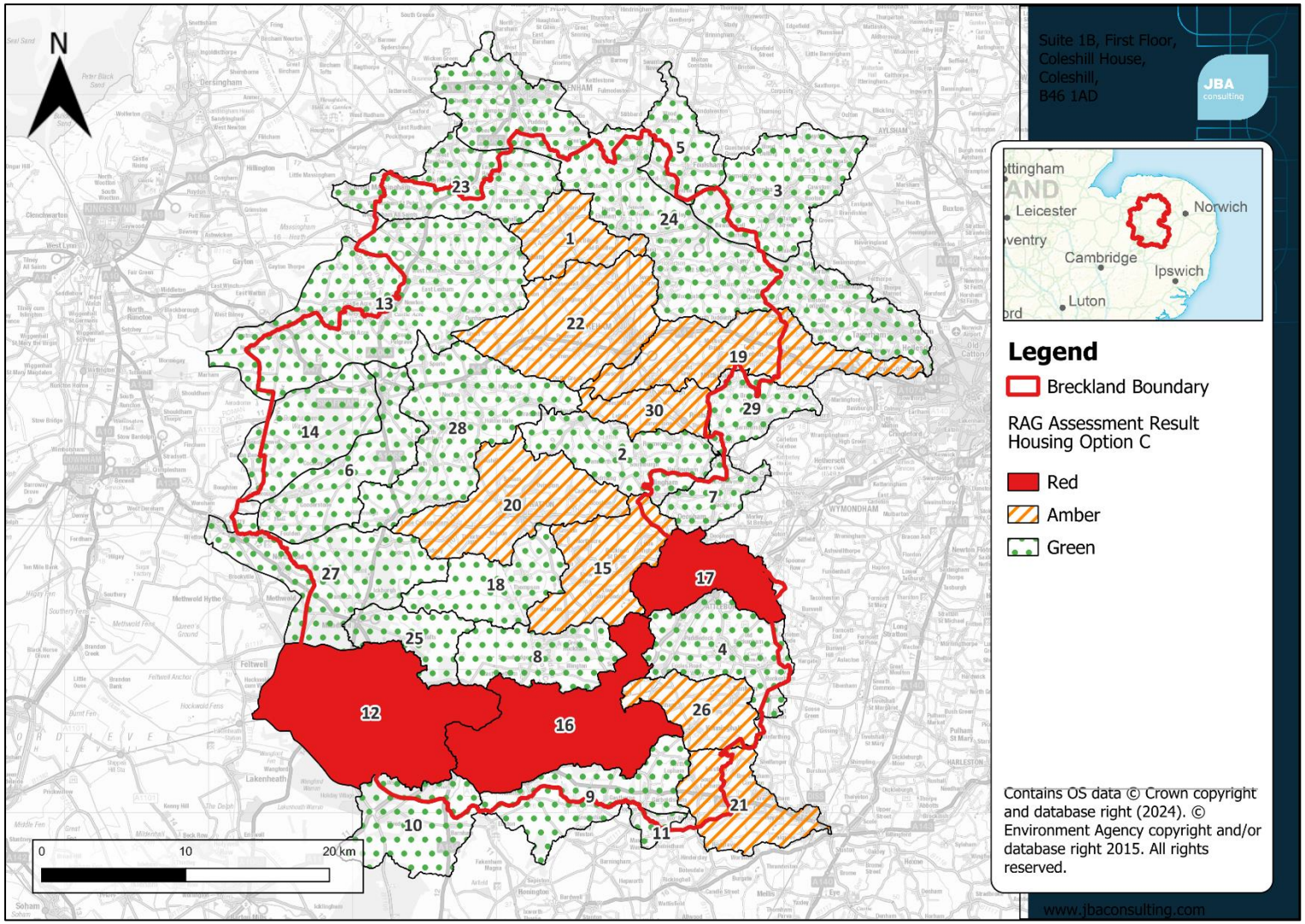


Figure 1-6: Results of the RAG assessment for Housing Option C.

2 Level 1 SFRA Policy recommendations

2.1 Broadscale recommendations

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

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

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

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

- Breckland District Council should work closely with neighbouring local authorities to develop complementary Local Planning Policies for catchments that drain into and out of the area to other local authorities in order to minimise any cross boundary issues of cumulative impacts of development.
- Developers should incorporate SuDS and provide details of adoption, ongoing maintenance, and management on all development sites. Proposals will be required to provide reasoned justification for not using SuDS techniques, where ground conditions and other key factors show them to be technically feasible. Preference will be given to systems that contribute to the conservation and enhancement of biodiversity and green infrastructure where practicable. Developers should refer to the relevant Lead Local Flood Authority (LLFA) guidance for the requirements for SuDS in Breckland District. Further guidance on SuDS can be found in Section 8 of the main report.
- Norfolk County Council as LLFA will review Surface Water Drainage Strategies in accordance with their local requirements for major and non-major developments. These should consider all sources of flooding to ensure that future development is resilient to flood risk and does not increase flood risk elsewhere.
- Where appropriate, the opportunity for NFM in rural areas, SuDS retrofit in urban areas and river restoration should be maximised. Culverting should not be supported, and day-lighting existing culverts should be promoted through new developments.
- Runoff rates from all development sites must be limited to greenfield rates (including brownfield sites) unless it can be demonstrated that this is not

practicable. If it is demonstrated that greenfield rates are not practicable then the runoff rates should be restricted to the closest rate that is practicable.

- Where required, site-specific FRAs should explore opportunities to provide wider community flood risk benefits through new developments. Measures that can be put in place to contribute to a reduction in flood risk downstream should be considered. This may be either by the provision of additional storage on site e.g. through oversized SuDS, NFM techniques, green infrastructure, and green-blue corridors, and/ or by providing a Partnership Funding contribution towards any flood alleviation schemes.
- Breckland District Council should consider requiring developers to contribute to community flood defences outside of their red line boundary to provide wider benefits and help offset the cumulative impact of development.

Section 7 of the main report details the local requirements for mitigation measures. Catchment-specific recommendations are made for high sensitivity catchments below.

2.2 Recommendations for high risk catchments

The high risk catchments for each development scenario are detailed in Section 1.6.1. High-level recommendations for flood storage and betterment have been proposed for sites in each of the high sensitivity catchments. These recommendations should be considered by developers as part of a site-specific assessment, but more detailed modelling must be undertaken by the developer to ascertain the true storage needs and potential at each site at the planning application stage. The FRA should consider the potential cumulative effects of all proposed development and how this affects sensitive receptors.

The following recommendations are made for high sensitivity catchments:

- Developers should include a construction surface water management plan to support the Construction Drainage Phasing Plan. This should provide information to the EA, the LLFA and the Local Planning Authority (LPA) regarding the proposed approach to surface water management in storm events during the construction phase.
- The LLFA and LPA should consult with Local Not-For-Profit organisations such as wildlife trusts, rivers trusts, and catchment partnerships. This will help to understand ongoing and upcoming projects where NFM, flood storage and attenuation, and environmental betterment may be possible alongside developments and aid in reducing flood risk.
- The LPA should work closely with the EA and the LLFA to identify any areas of land that should be safeguarded for any future flood alleviation schemes and NFM features. Investigations should seek to determine where developments have the potential to contribute towards works to reduce flood risk and enable regeneration in catchments as well as contributing to the wider provision of green infrastructure.

The following sections set out specific recommendations for each high sensitivity catchment identified within this CIA.

2.2.1 Thet (US Swangey Fen)

This catchment ranked as high sensitivity across all development scenarios.

The catchment lies mostly within Breckland District but also partially within South Norfolk District at its upstream end. Therefore, any proposed development in South Norfolk that lies within this catchment should consider the potential implication of flood risk downstream in Breckland District.

No development is currently proposed within this catchment, however, if any future windfall sites are proposed then developers should consider the general recommendations above for high risk catchments so that existing flooding issues in the catchment are not exacerbated by any future development and options for betterment are considered.

2.2.2 Wendling Beck

The Wendling Beck catchment ranked as high sensitivity for Housing Option B, due to the proposed development within the catchment. Development is also proposed within this catchment for Housing Option A however it only ranked as medium sensitivity for this Housing Option due to the extent of proposed development being smaller.

This catchment lies wholly within Breckland District, and covers the town of Dereham, where the recorded historic flooding incidences are concentrated.

For Housing Option A, the proposed strategic development is within the south of the catchment, upstream of Dereham. This site is at a greenfield location, therefore there are likely to be many potential opportunities to provide additional betterment for SuDS and surface water attenuation beyond the existing runoff rate. There may be opportunities to use oversized SuDS and natural flood management features across the site to reduce flood risk downstream, particularly in the northern end of the development site where there is both fluvial and surface water flood risk.

For Housing Option B, the proposed development is within the northeast of the catchment. This site is located on high ground to the south of the confluence of the Blackwater and River Wensum and is not shown to be at fluvial flood risk. However, there are several small surface water flow paths which flow downstream from the site towards the watercourses. The site is partially brownfield (in the east side) and therefore there may be opportunities to provide additional betterment for SuDS and surface water attenuation beyond the existing runoff rate to reduce flood risk downstream.

There are also a number of additional proposed housing sites in the south of the catchment. Given the location of the sites some water will drain north within the catchment towards Dereham and Wendling Beck and some will drain east towards the River Tud. The sites cover a considerable greenfield area and are shown to be at some fluvial risk from a tributary of Wendling Beck and there may be opportunities for natural flood management features and on-site storage to reduce the fluvial flood risk downstream in the catchment.

2.2.3 Blackwater (Wendling Beck)

The Blackwater (Wendling Beck) catchment ranked as highly sensitivity for Housing Option B, due to the proposed development within the catchment but is also ranked as medium risk for the other Housing Options as the catchment is shown to be highly sensitive to increased surface water risk and as a medium sensitivity to increases in fluvial risk.

This catchment lies wholly within Breckland District and is predominantly rural.

The proposed development is located at the downstream end of the catchment, in the southeast, on high ground to the south of the confluence of the Blackwater and River Wensum. Given the location of the development within the catchment, there are unlikely to be opportunities to use this development to provide flood risk betterment within the catchment. If any future windfall sites are proposed across the wider catchment, then developers should consider the general recommendations above for high risk catchments so that existing flooding issues in the catchment are not exacerbated by any future development and options for betterment are considered.

2.2.4 Little Ouse River

The Little Ouse River catchment ranked as highly sensitive for all three Housing Options due to being highly sensitive to increased fluvial flood risk and ranking as high risk for historic flooding.

This upstream end of the catchment lies in the southwest side of Breckland District with the downstream end of the catchment within both West Suffolk District and King's Lynn and West Norfolk District. The catchment contains the urban centre of Brandon.

There are a couple of small brownfield development sites located within the catchment, which will provide an opportunity to reduce the existing runoff rate to at least the greenfield rate and potentially provide betterment for downstream flood risk both within Breckland District and downstream along the Little River Ouse where it flows through King's Lynn and West Norfolk District.

2.2.5 Thet (DS Swangey Fen)

The Thet (DS Swangey Fen) catchment ranked as highly sensitive for all three Housing Options due to ranking high risk for proposed development and having a medium risk from historic flooding and increased fluvial flood risk.

This catchment lies wholly within the south of Breckland District and is predominantly rural but covers the eastern side of Thetford at its downstream end.

There are a considerable number of proposed sites within this catchment, within both the upstream and downstream reaches. The catchment itself is shown to be sensitive to increased fluvial flood risk, however there is minimal fluvial risk shown to any of the proposed development sites within the catchment. However, there are several greenfield sites proposed around the north side of Thetford. There may be opportunities to use oversized SuDS and natural flood management features across the site to reduce flood risk

downstream within the urban centre. There are also a number of greenfield sites proposed in the upstream end of the catchment where there may be opportunities to use oversized SuDS and natural flood management features across the sites to reduce flood risk downstream within the catchment.

2.3 Development within medium sensitivity catchments

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

- LPAs should work closely with the EA and the LLFA to identify any areas of land that should be safeguarded for any future flood alleviation schemes and NFM features.
- There is the potential for development in these catchments to contribute towards works to reduce flood risk and enable regeneration as well as contributing to the wider provision of green infrastructure.

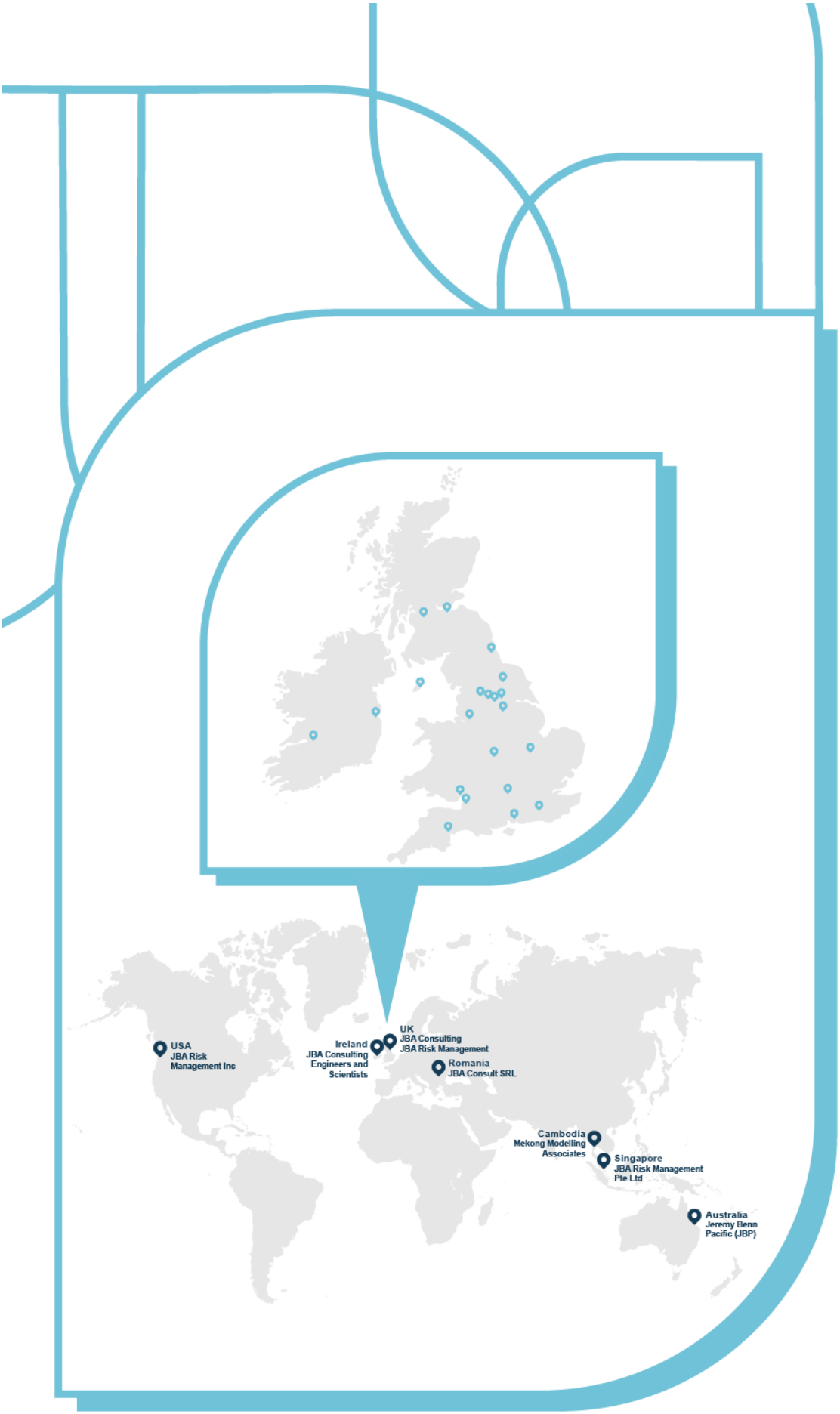
This is applicable to the following catchments:

- **Stow Bedon Stream**
- **Tud**
- **Watton Brook**
- **Blackwater (Wendling Beck)** for Housing Options A and C
- **Wendling Beck** for Housing Options A and C
- **Whittle**
- **Yare (u/s confluence with Tiffey - Upper)**

The following catchments ranked medium but with no currently proposed development sites:

- **Whittle**
- **Waveney (u/s Frenze Beck)**
- **Stow Bedon Stream**

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



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