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2. Derbyshire County Council Area Wide Impacts

2.1 Rainfall Distribution

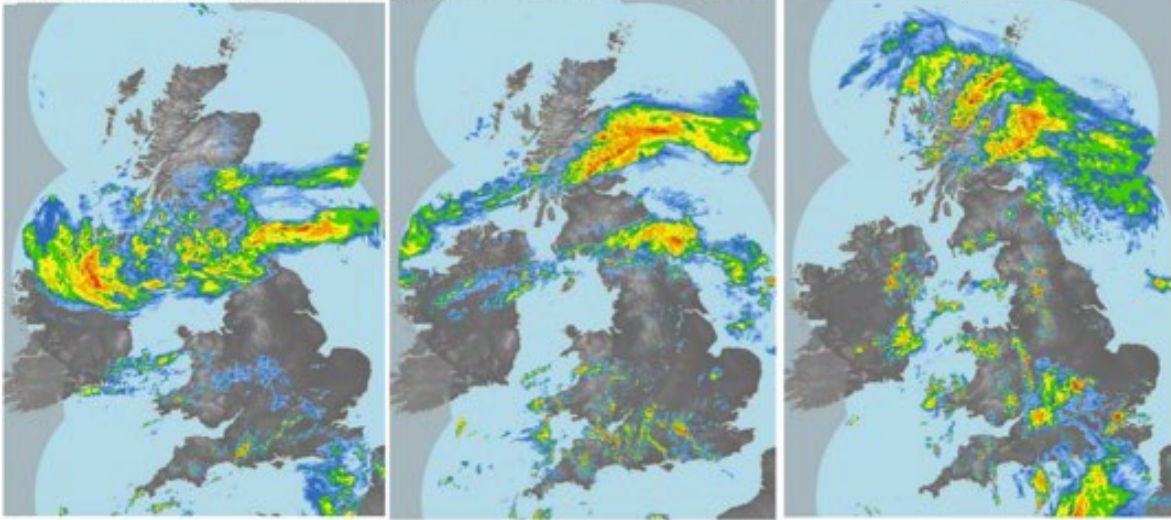
2.1.1 Storm Track

Storm Babet brought persistent and heavy rain across Derbyshire, with the heaviest rainfall recorded during Friday the 20th of October 2023. Rainfall recorded during Storm Babet was the third wettest independent 3-day period for England and Wales

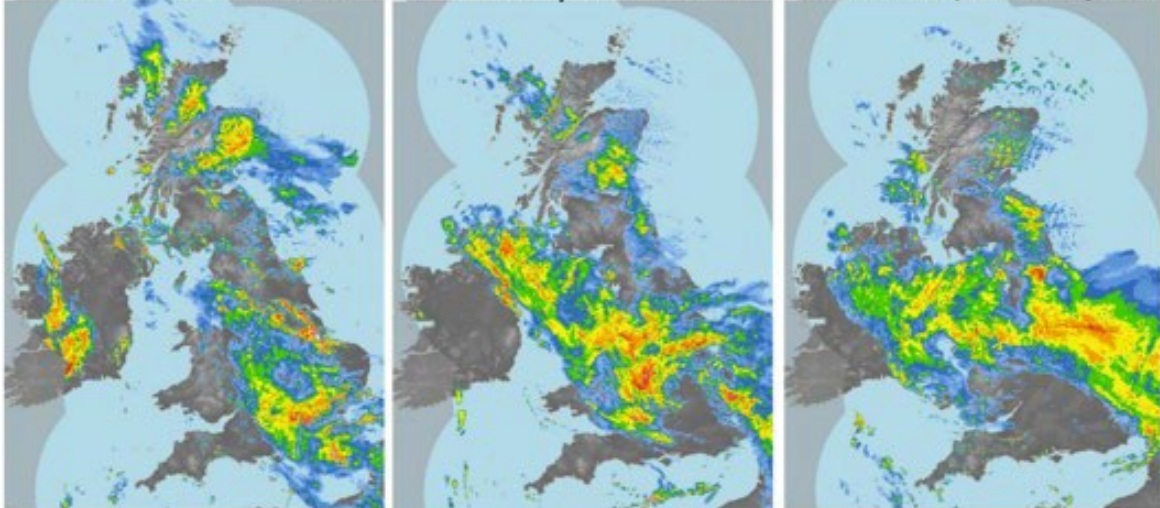
(https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2023/2023_08_storm_babet.pdf). Storm Babet originated near Portugal and tracked from south to north, picking up additional moisture as it crossed the Bay of Biscay. This is different to most Atlantic storm systems affecting the UK which normally track west to east, driven by the jet stream and clearing eastward quickly. Storm Babet was unable to clear eastward into the North Sea due to a blocking area of high pressure across Scandinavia. Rain bearing fronts therefore remained stationary across eastern Scotland for a prolonged period, before moving back across England and Wales causing the exceptionally high rainfall totals recorded.

Rainfall radar data recorded by the Met Office and illustrated in Figure 2-1 indicates rainfall intensities at 6-hour intervals from 6am on the 19th of October to midnight on the 21st of October. This provides an overview of spatial variation of rainfall across the United Kingdom throughout Storm Babet. This is supported by local rain gauge data for each catchment, discussed in the Catchment Event Hydrology in sections 3.1, 4.1, 5.1, 6.1 and 7.1. It is evident from the radar imagery that rainfall was most intense across Derbyshire on the 20th of October between 6am and 6pm. Rates of rainfall peaked in some areas of Derbyshire at 8mm to 16mm an hour. Rainfall radar indicates Storm Babet was starting to clear by the 21st of October, however rainfall was still falling at rates up to 4mm an hour across the Midlands.

1. 19 Oct, 06:00am: 2. 19 Oct, 12:00pm: 3. 19 Oct, 06:00pm:



4. 20 Oct, 12:00am: 5. 20 Oct, 06:00am: 6. 20 Oct, 12:00pm:



7. 20 Oct, 06:00pm: 8. 21 Oct, 12:00pm:

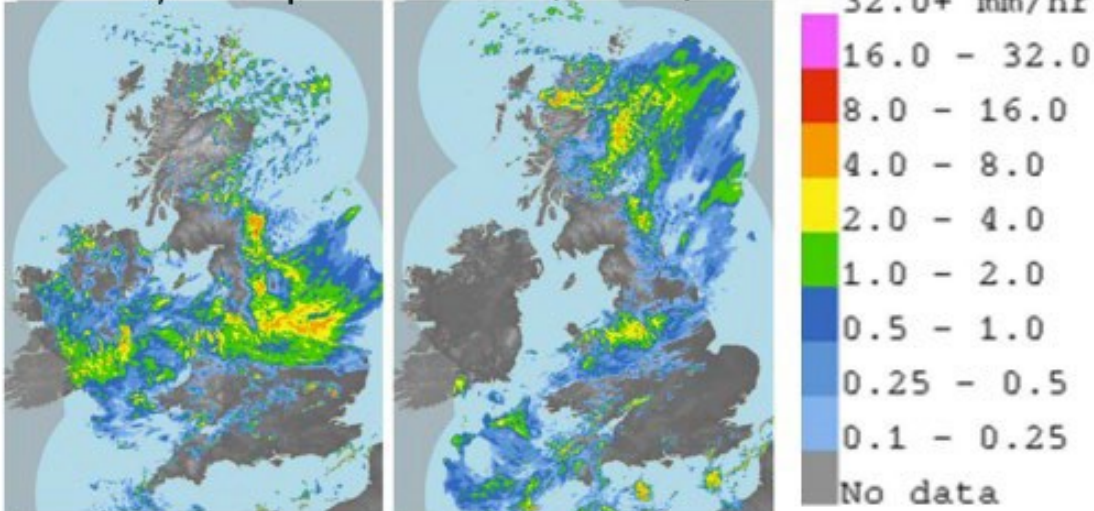


Figure 2-1: Rainfall radar images at 6-hour intervals from 6am on 19th of October to midnight on the 21st of October 2023

2.1.2 Recorded Rainfall

Figure 2-2 illustrates accumulated daily rainfall totals for the 4-day period of Storm Babet and the percentage of the October whole month 1991-2020 rainfall average. It indicates between 30-150mm fell across Derbyshire each day, equating to 30-150% of recorded October whole month averages.

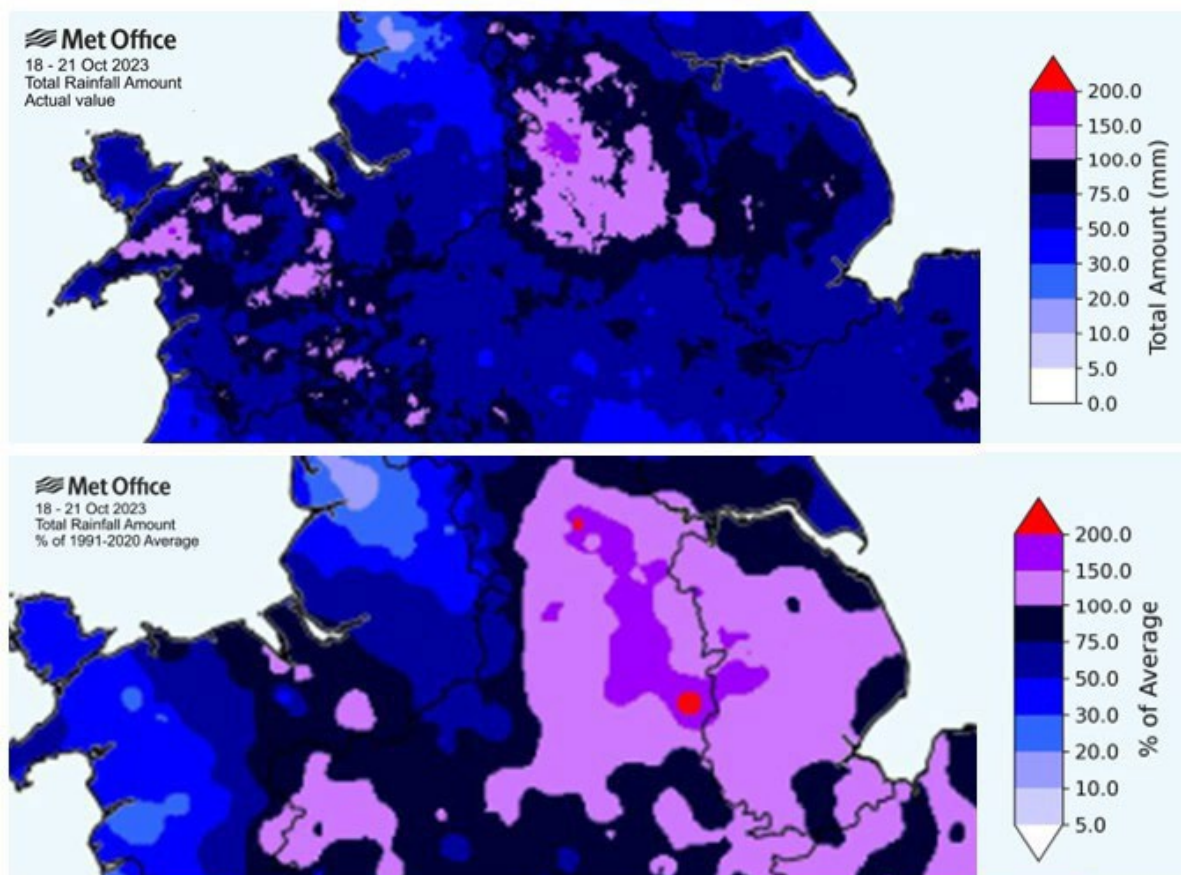


Figure 2-2: Daily rainfall accumulations from 18th to 21st of October 2023 across the Midlands as actual totals (top) and percentage of the October whole month average (bottom)

2.2 Comparison to the Long-Term Average

In the three months prior to Storm Babet, the Midlands received above normal rainfall compared to the long-term average. By the 17th of October the Environment Agency's Midlands Area (which includes much of Derbyshire) had received 90% of the long-term average monthly rainfall for the month of October.

Rainfall totals from the 18th to the 21st of October were in the top 5% of historical rainfall records for an equivalent period. A week prior to Storm Babet, rainfall above the 1991-2020 average was recorded from the 10th to the 14th of October, therefore Derbyshire experienced other high rainfall events in the lead-up to the Storm Babet event.

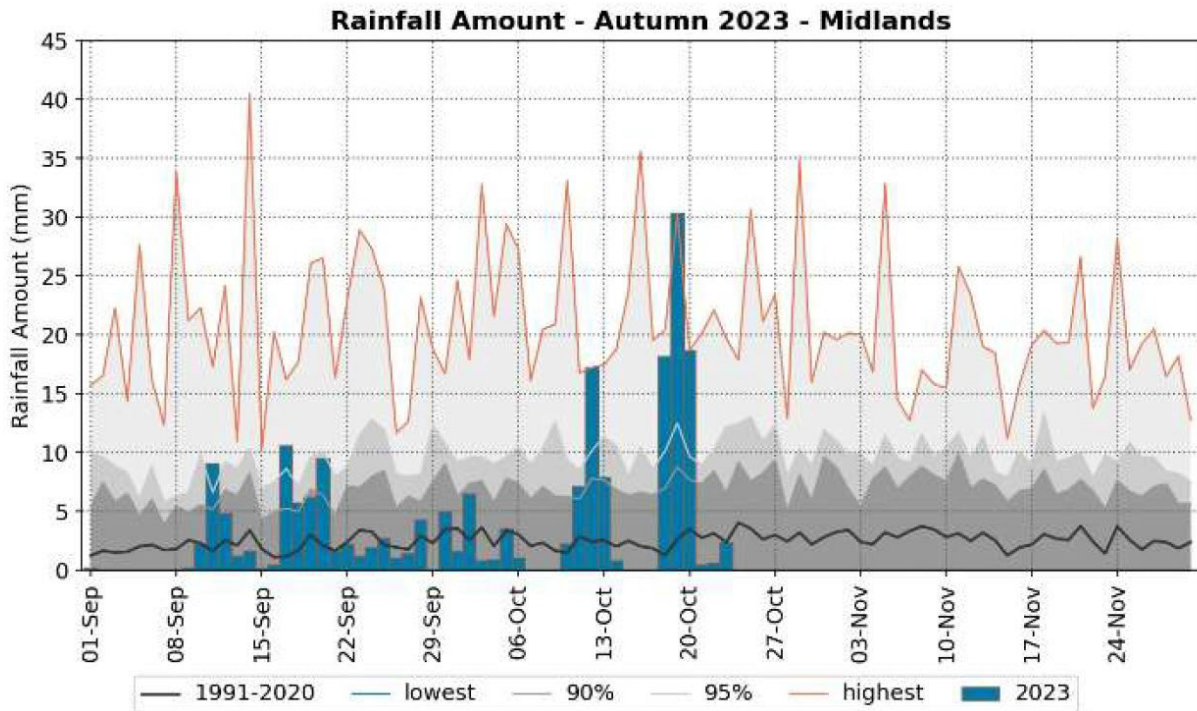


Figure 2-3: Daily rainfall totals for autumn recorded in the Midlands compared to rainfall average from 1991-2020, highest rainfall recorded (orange) and 90th (dark grey) and 95th (light grey) percentiles from the historical record. The 90th and 95th percentiles indicate that 90% and 95% of all rainfall amounts are lower than the value shown, respectively.

2.3 Weather Warnings

The Met Office issue warnings of severe or hazardous weather (rain, snow, wind, fog, and ice), which has the potential to cause damage, widespread disruption or danger to life. These warnings are given a colour rating relating to a combination of both the likelihood of the event happening, and the impact the conditions may have. These warnings are issued to the public and emergency responders through the National Severe Weather Warning Service. The warnings issued to Derbyshire included yellow and amber. A red warning also exists but was not issued to any part of Derbyshire during Storm Babet. The categorisation of weather warnings is explained below.

Yellow 'be prepared' weather warnings indicate that severe weather is possible over the next few days and could affect people within its coverage area. The Met Office recommends that people keep an eye on the latest forecast and be aware that the weather may change or worsen, leading to disruption of your plans in the next few days.

Amber 'be prepared' weather warnings represent a medium likelihood of severe weather. There is an increased likelihood of bad weather affecting people, which could potentially disrupt plans and possibly cause travel delays, road and rail closures, interruption to power and the potential risk to life and property.

Red 'take action' weather warnings indicate that there is a high likelihood of severe weather, and that extreme weather is expected. The Met Office advises that people take action to keep themselves and others safe from the impact of the weather. Widespread damage, travel and power disruption and risk to life is likely. People must avoid dangerous areas and follow the advice of the emergency services and local authorities.

Leading up to Storm Babet, the Met Office issued the first weather warning covering Derbyshire at 11:48am on Monday the 16th of October, which was a yellow warning for rain, as shown in Figure 2-4. This warning period started at 9:00pm on Wednesday the 18th of October and ended at 06:00am on Saturday the 21st of October. The spatial extent and period of coverage of this yellow weather warning for rain was updated four times, before an amber warning for rain was issued at 10:40am on Thursday the 19th of October, covering all of Derbyshire. The spatial coverage of this amber weather warning was updated at 11:21am on Thursday the 19th of October, but this did not affect Derbyshire. All weather warnings covering Derbyshire had expired by 6:00am on Saturday the 21st of October, by which time the Storm Babet event had ended. The Met Office did

not issue a red weather warning across Derbyshire during Storm Babet.

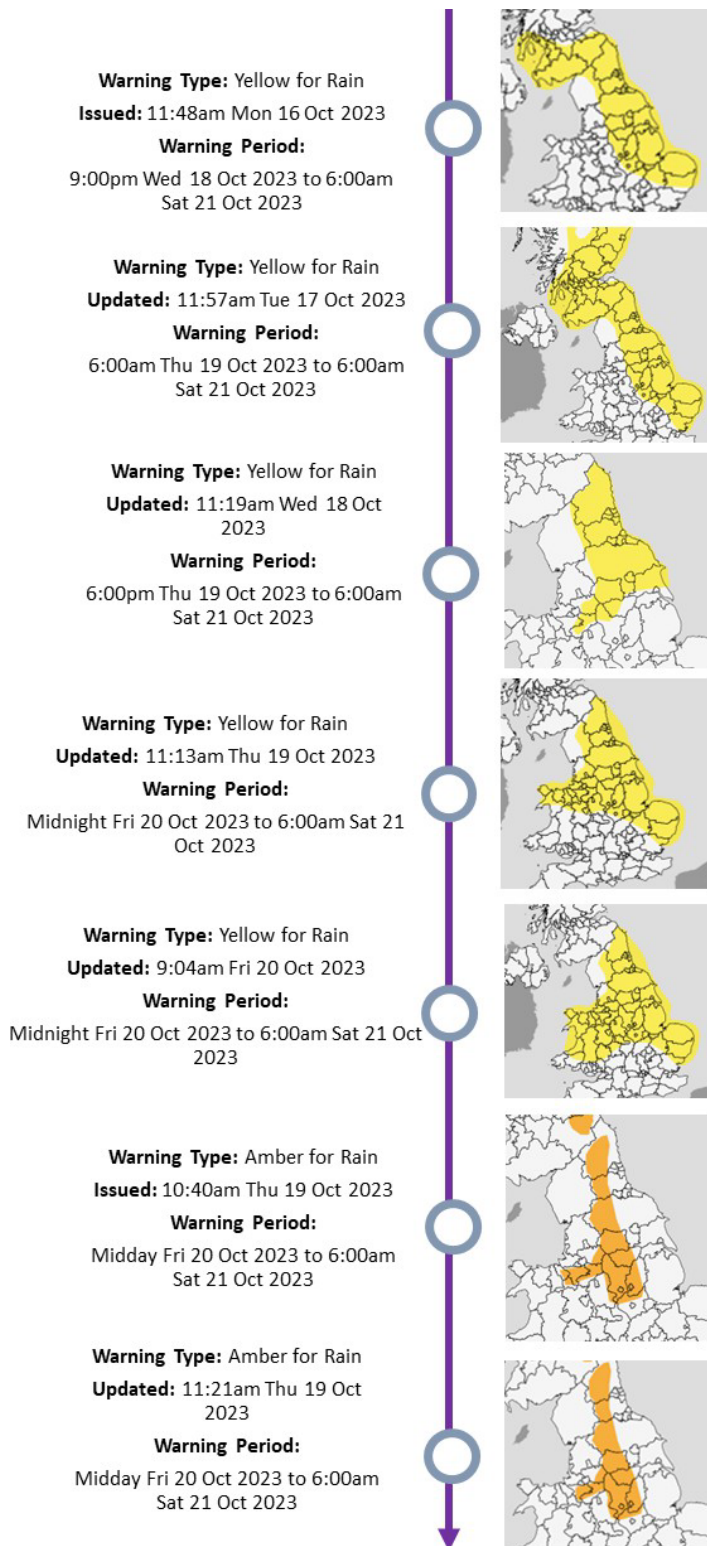


Figure 2-4: Timeline visual of the type, timing and coverage of rain weather warnings issued by the Met Office in the lead-up to and during Storm Babet that cover Derbyshire

2.4 Flood Warnings

The Environment Agency issue flood warnings related to flooding from rivers, the sea or groundwater, depending on your area, but not for surface water flooding. Flooding from rivers is relevant to this investigation.

The Environment Agency issue three types of flood warnings to allow communities to prepare for flooding, including from designated main rivers. Fluvial flooding occurs when the water level in a river or lake rises and

overflows onto the neighbouring land. Each of the three different flood warning types are used depending on the severity of flooding expected. The three flood warning types are; a Flood Alert, a Flood Warning, or a Severe Flood Warning. These are often issued sequentially at different intervals in advance of flooding. Flood Alert areas cover a large area, whilst Flood Warning areas are usually more detailed and broken down into specific locations. Some Flood Alert areas are not covered by Flood Warning areas. Figure 2-5 displays the icons for the three types of warning, and each is described in the following sub-sections.



Figure 2-5: Symbols for flood alerts, flood warnings and severe flood warnings, respectively

2.4.1 Flood Alerts

Flood Alerts indicate that flooding is possible, and people are advised to 'be prepared'. Flood Alerts are issued between two hours and two days in advance of flooding. The Environment Agency advice is that the public prepare themselves by:

- preparing themselves to act on their flood plan;
- preparing a flood kit of essential items; and
- monitoring local water levels and the flood forecast on the Met Office website.

2.4.2 Flood Warnings

Flood Warnings indicate that flooding is expected, and that immediate action is required. Flood Warnings are issued between half an hour and one day in advance of flooding. The Environment Agency advice is that the public undertake the following actions:

- moving family, pets and valuables to a safe place;
- turning off gas, electricity, and water supplies if safe to do so; and
- putting flood protection equipment in place.

2.4.3 Severe Flood Warnings

Severe Flood Warnings indicate that severe flooding is expected and that there is a danger to life. The Environment Agency advice is that the public:

- stay in a safe place with a means of escape;
- be ready should there be a need to evacuate from their home;
- co-operate with the emergency services; and
- call 999 if in immediate danger.

2.4.4 Receiving Flood Warnings

The public can sign up free-of-charge to receive flood warnings if their home or business is at risk of flooding via the government website: <https://www.gov.uk/sign-up-for-flood-warnings>.

Those wanting to sign up to receive flood warnings will need to provide:

- the address you want flood warnings for;
- an email address; and
- a way to contact you at any time of day or night.

Current flood warnings can be viewed on the government website: (<https://check-for-flooding.service.gov.uk/alerts-and-warnings>).

Alternatively, the public can call Floodline:

- Telephone: 0345 988 1188
- Textphone: 0345 602 6340
- Open 24 hours a day, 7 days a week

2.4.5 Flood Alerts and Warnings Issued for Storm Babet

According to the Environment Agency, 26 Flood Alerts, 99 Flood Warnings and 1 Severe Flood Warning were issued within Derbyshire before and during Storm Babet. Figure 2-6 shows the locations of the Flood Alert Areas and Flood Warning Areas during the storm event. Further information on Flood Alert areas and Flood Warning areas can be found on the [GOV.UK website \(https://check-for-flooding.service.gov.uk/river-and-sea-levels\)](https://check-for-flooding.service.gov.uk/river-and-sea-levels).

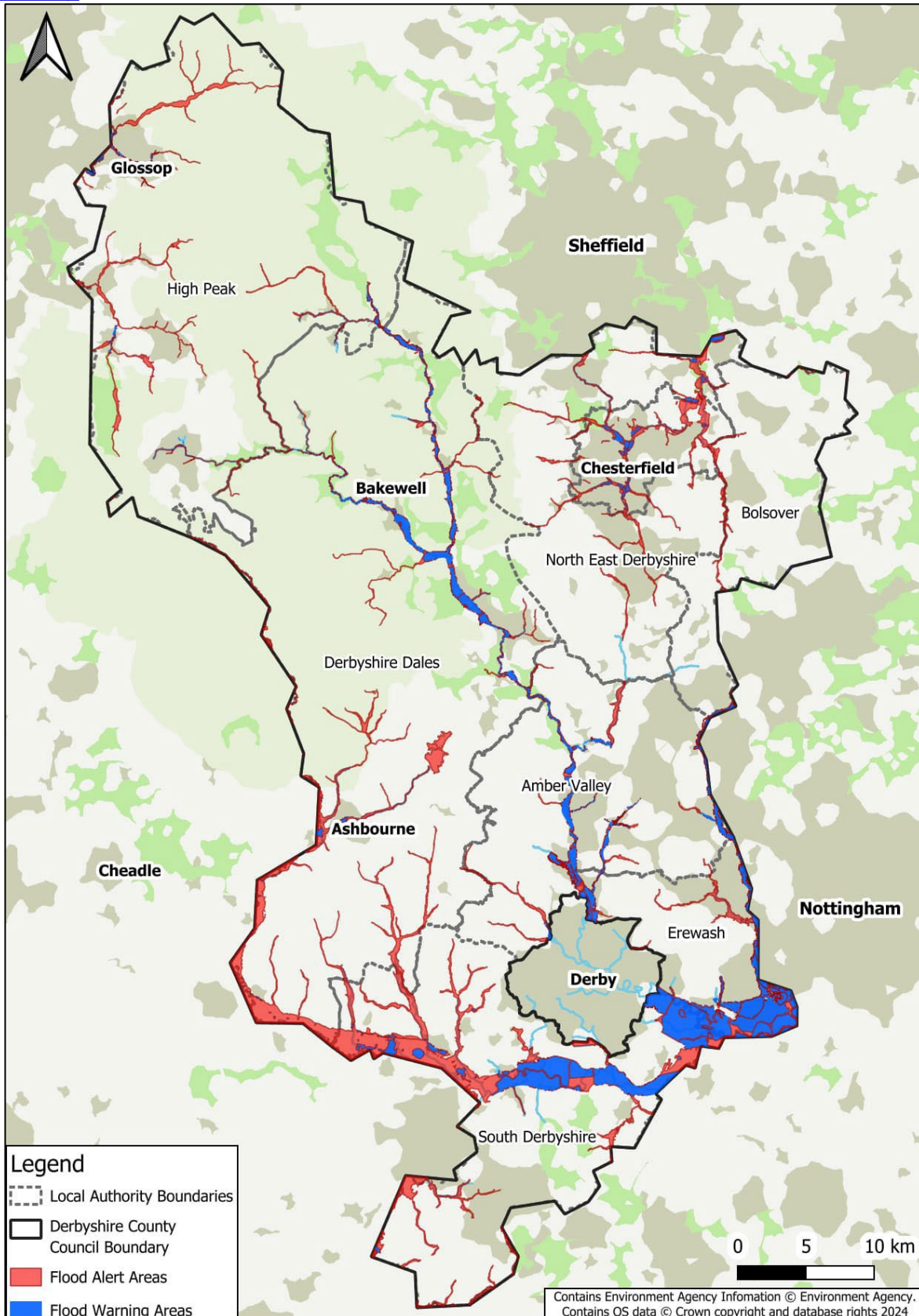


Figure 2-6: Areas where Flood Alerts and Flood Warnings were issued by the Environment Agency across Derbyshire County in the lead-up to and during Storm Babet

Within Derbyshire, flooding of properties occurred within 19 of the 26 areas where a Flood Alert was issued and within 56 of the 99 areas where a Flood Warning was issued.

The first Flood Alert affecting Derbyshire was issued for the River Erewash in Derbyshire and Nottinghamshire on the 19th of October at 1:13am. The first Flood Warning affecting Derbyshire was issued for the River Erewash at Langley Mill on the 20th of October at 6:44am.

A small part of Derbyshire County Council's area received a Severe Flood Warning, namely the River Derwent at Racecourse Park at Chaddesden. This was issued on the 21st of October at 9:45am. However, no properties were reported to have flooded.

2.5 Affected Communities by Catchment

Across the 35 communities that have been investigated, a total of 1,284 properties were flooded internally. Table 2-1 categorises these communities by Water Framework Directive (WFD) catchment and shows the number of internally flooded properties. Figure 2-7 shows the location of affected communities that are discussed in this report.

38% of internally flooded properties across Derbyshire are located within the Don and Rother catchment, making it the most severely affected catchment in Derbyshire during Storm Babet. Breaston, Sandiacre and several Chesterfield communities, including Tapton Terrace, Brampton and Chesterfield South, were worst affected. More than 100 residential properties were flooded both in Breaston and Sandiacre, while a total of over 400 residential properties were flooded in Chesterfield.

Table 2-1: Communities affected by internal flooding, categorised by catchments.

Water Framework Directive (WFD) Catchment	Total number of internally flooded properties within investigated communities by catchment
Derwent Derbyshire	267
Don and Rother	514
Dove	23
Idle and Torne	15
Trent and Lower Erewash	465

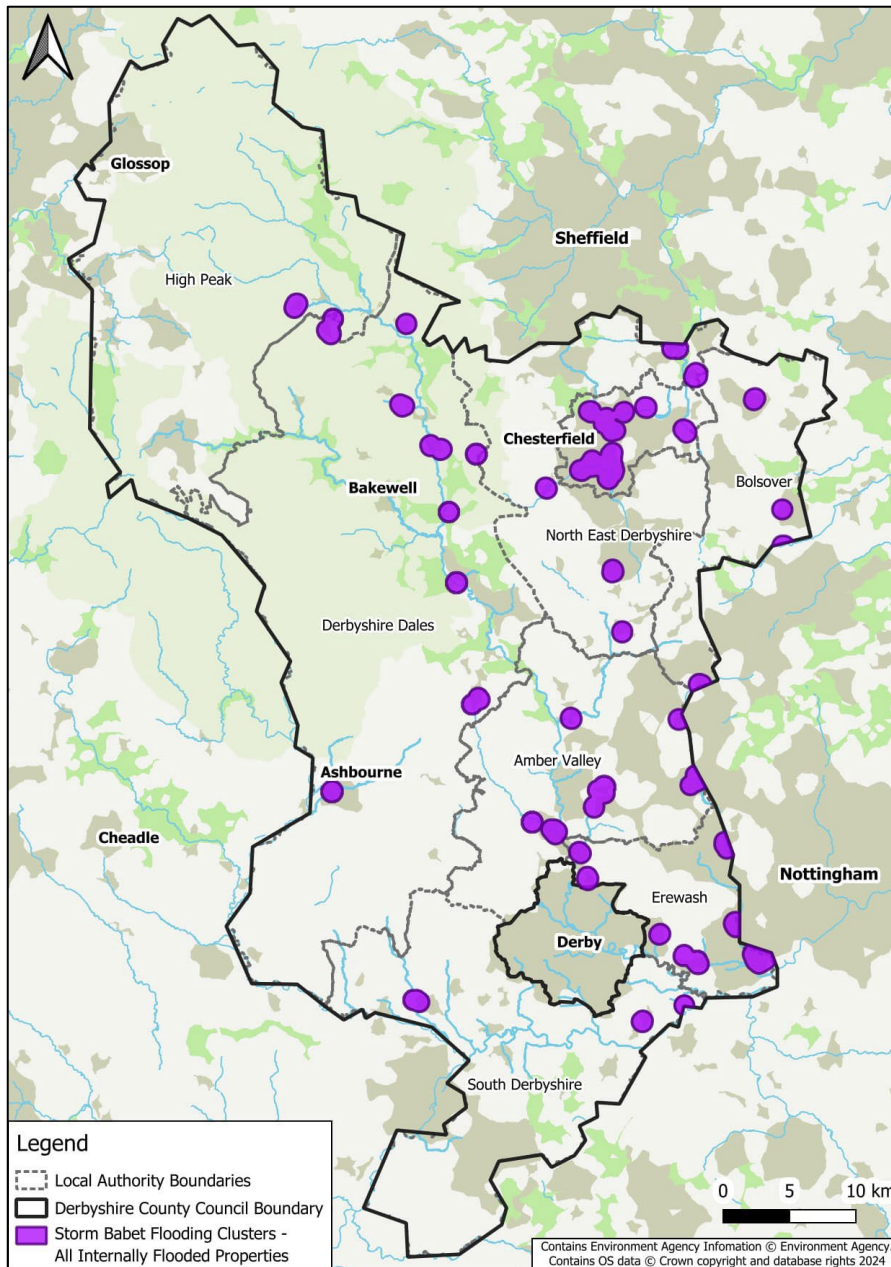


Figure 2-7: The distribution of communities most badly affected during Storm Babet.

2.6 Affected Properties by District and Borough Councils

Figures 2-8 shows the number of internally flooded residential and non-residential properties flooded within each of the district and borough councils within the Derbyshire County Council area.

The district and borough councils are as follows:

- Amber Valley Borough Council (AVBC)
- Bolsover District Council (BDC)
- Chesterfield Borough Council (CBC)
- Derbyshire Dales District Council (DDDC)
- Erewash Borough Council (EBC)
- High Peak Borough Council (HPBC)
- North East Derbyshire District Council (NEDDC)
- South Derbyshire District Council (SDDC)

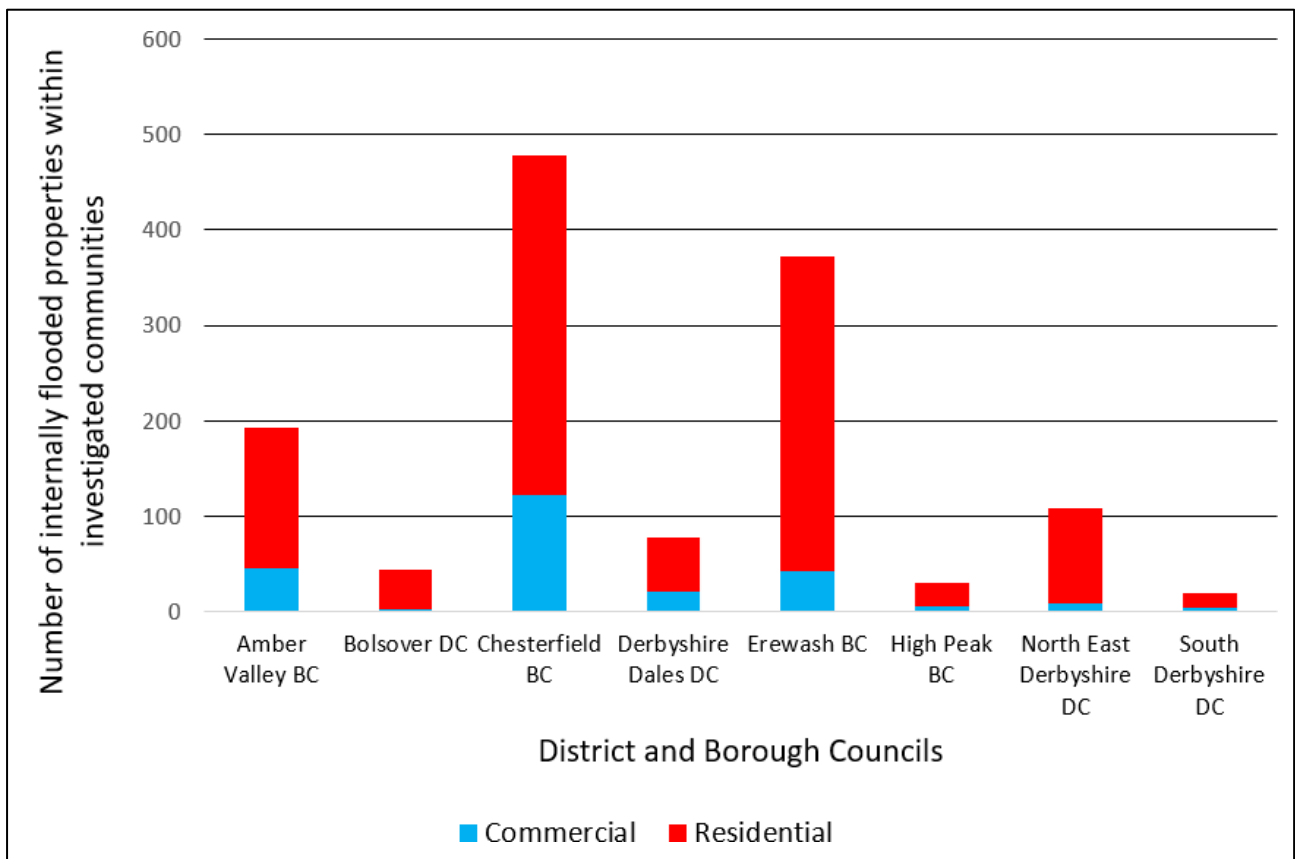


Figure 2-8: Total number of internally flooded properties in each district and borough council, divided by property type.

2.7 Community Impacts

The impact of Storm Babet and the response of public bodies is assessed on a community-scale in sections 3 to 7. In total, 35 communities within 5 management catchments across Derbyshire met the criterion required to undertake these investigations (see sub-section 1.4 for criterion details). Table 2-2 lists these communities, which management catchment they are within and provides a reference to the relevant sub-section of this report where the communities are covered.

Table 2-2: The communities investigated within this report and their relevant sub-section.

Community	Catchment	Sub-Section	Community	Catchment	Sub-Section
Lilac Way	Derwent	3.2	Chesterfield South	Don and Rother	4.7
Ridgeway	Derwent	3.3	Renishaw	Don and Rother	4.8
Baslow East	Derwent	3.4	Tapton Terrace	Don and Rother	4.9
Little Eaton	Derwent	3.5	Central Chesterfield	Don and Rother	4.10
Lower Kilburn	Derwent	3.6	Meadow Close	Don and Rother	4.11
Denby Bottles	Derwent	3.7	Eckington	Don and Rother	4.12
Breadsall	Derwent	3.8	Ashbourne	Dove	5.2
Ockbrook	Derwent	3.9	Hilton	Dove	5.3
Stoney Middleton	Derwent	3.10	Clowne	Idle and Torne	6.2
Duffield	Derwent	3.11	Draycott	Erewash	7.2
Bradwell	Derwent	3.12	Ilkeston	Erewash	7.3
Castleton	Derwent	3.13	Sandiacre	Erewash	7.4
Clay Cross	Derwent	3.14	Long Eaton	Erewash	7.5
Poolsbrook	Don and Rother	4.2	Langley Mill	Erewash	7.6
Station Road	Don and Rother	4.3	Ironville	Erewash	7.7
Holymoorside	Don and Rother	4.4	Pinxton	Erewash	7.8
Chatsworth Road West	Don and Rother	4.5	Aston-on-Trent	Erewash	7.9
Brampton	Don and Rother	4.6			