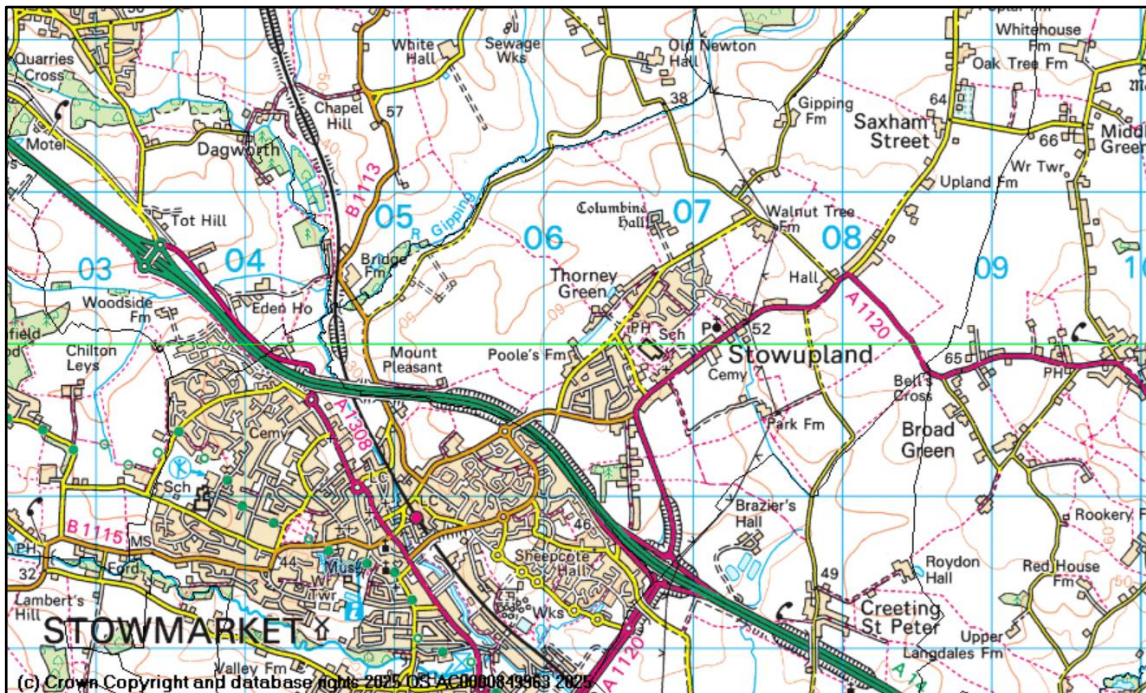


Section 19 Flood and Water Management Act 2010

Stowupland Flood Investigation –

Storm Babet 2023



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Executive Summary

Storm Babet caused significant disruption to communities across Suffolk between 18th - 21st October 2023. Stowupland was a community that was significantly impacted, with approximately six properties suffering internal flooding as well as disruption to infrastructure and services. Suffolk County Council, as Lead Local Flood Authority, have therefore undertaken a Section 19 Flood Investigation. The resulting report will:

- highlight the probable causes of flooding
- identify options to reduce future flood risk and increase property resilience
- make recommendations for actions by relevant responsible organisations, landowners or homeowners.

Stowupland is located in an area at significant risk of pluvial flooding and the nature of the surrounding topography and geology contributes to the susceptibility of the community to flooding. The local superficial geology and soils are susceptible to high run off, making a high number of properties in the village vulnerable to flooding due to intense rainfall events. The relatively flat nature of the area surrounding affected property and the clay soils and superficial geology also reduced the rate at which floodwater was able to drain away or infiltrate.

Storm Babet delivered significant rainfall to the catchment, following an extended period of above average rainfall. Impacts within Stowupland were widespread and for the purposes of this report, the affected areas have been categorised into two zones: Saxham Street and Thorney Green Road. The description of the flood events detailed in the report have been compiled using data submitted to Suffolk County Council, as well as information from Risk Management Authorities (e.g. Suffolk County Council Highways and Anglian Water) and the community.

A comprehensive summary for each zone is provided within the report, outlining the context of the event and the impact. Key findings are that Stowupland was severely impacted by flooding due to the intensity and duration of rainfall which overwhelmed the natural flow routes and the capacity of watercourses and drainage infrastructure. This situation was compounded when overland flow paths converged and saw the resultant internal flooding of property.

Short, medium and longer term recommendations have been published and each have a potential role to improve resilience and reduce the risk of flooding to Stowupland. For short term measures, key highlights include the implementation of a community flood plan and maximising Property Flood Resilience (PFR) grants. Further investigations by Anglian Water and SCC Highways regarding the drainage system in the affected area of Saxham Street are recommended. Investigations regarding the potential for increasing the drainage capacity surrounding the affected area of Thorney Green Road are also recommended in the medium term.

Justification for Investigation

Suffolk County Council, Lead Local Flood Authority (LLFA) has determined that in accordance with our criteria, it is considered necessary and appropriate to carry out an investigation into this flood event.

This is in accordance with Section 19 (1) of the Flood and Water Management Act 2010, and in accordance with Section 19 (2) of the Flood and Water Management Act 2010, to publish the results and notify the relevant risk management authorities (RMAs).

Section 19 Local authorities: investigations

(1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate -

(a) which risk management authorities have relevant flood risk management functions, and

(b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.

(2) Where an authority carries out an investigation under subsection (1) it must -

(a) publish the results of its investigation, and

(b) notify any relevant risk management authorities

Criteria for an investigation (as per Appendix D of the Suffolk Flood Risk Management Strategy):	
There was a risk to life because of flooding?	
Internal flooding of one property (domestic or business) has been experienced on more than one occasion?	
Internal flooding of five properties has been experienced during one single flood incident	✓
Where a major transport route was closed for more than 10 hours because of flooding	
Critical infrastructure was affected by flooding	
There is ambiguity surrounding the source or responsibility of a flood incident	

Understanding the flood context

1. What happened during Storm Babet

A succession of weather fronts between the 11th and 13th of October 2023 brought significant rainfall to the region. Readings indicate that between 30mm and 50mm of rain fell across Suffolk compared with an average of just less than 65mm across the whole month of October according to Met Office weather data (Met Office, 1991-2020). This significant rainfall occurred in a short space of time and resulted in saturated land and rivers reaching their capacity. Shortly after this, Storm Babet followed on the 18th to 21st of October 2023. The storm brought between 50 mm and 80 mm of rain to much of central and northern East Anglia, with some Suffolk weather stations recording the wettest October day on record.

The Environment Agency river level gauging stations indicated many flows close to or exceeding their highest on record, and the weather remained wetter than average for the rest of the month. October 2023 was the joint wettest on record in the east of England since 1871. During Storm Babet, Suffolk saw the heaviest rainfall across East Anglia causing significant flooding of roads and properties. The river systems rose rapidly across whole catchments due to the existing conditions, which was unusual as storms will often impact a small area and result in a steady progression of flood water downstream. A major incident was declared by the Suffolk Resilience Forum (SRF) in the afternoon of the 20th of October due to significant impacts on communities and disruption to the road and rail networks.

The following maps illustrate the extent to which the rainfall in the months preceding Storm Babet exceeded the average monthly rainfall for July to October in recent years in Suffolk.

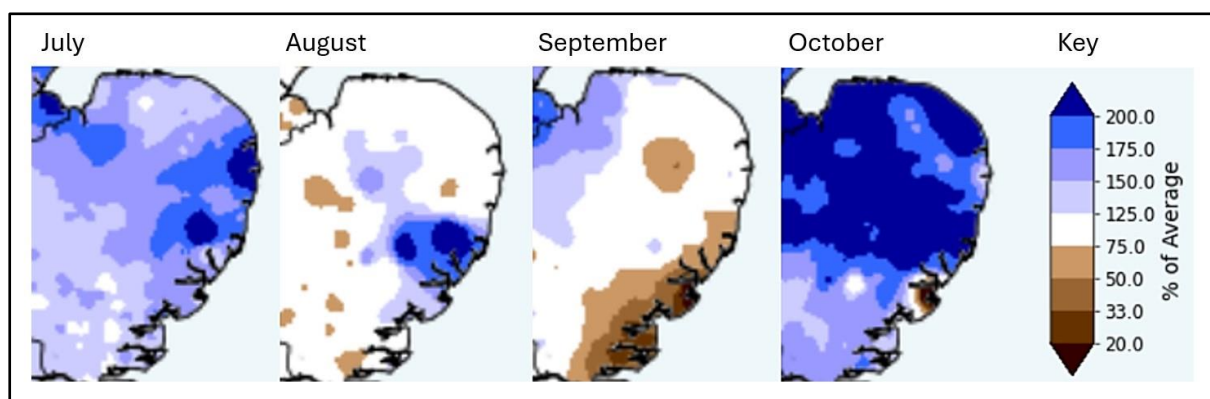


Figure 1. Average rainfall in East Anglia between July and October 2023 as a percentage of the historical average monthly rainfall

The following report acknowledges that October 2023 and in particular, Storm Babet, was an extreme event and will assess the probable causes and impacts. The report will recommend measures to reduce the risk of flooding within the location, in line with best practice, ranging from large to small scale interventions and be targeted at a range of stakeholders. It should be noted that Storm Babet was a significant event,

with a low probability of recurrence. The recommendations will provide advice about reducing flood risk. However, they should not be relied upon as a guaranteed failsafe to mitigate against all future flooding.

2. Location of flooding

The parish of Stowupland borders the northeast of Stowmarket and is approximately twelve miles northwest of the town of Ipswich. It is in the local authority district of Mid Suffolk.

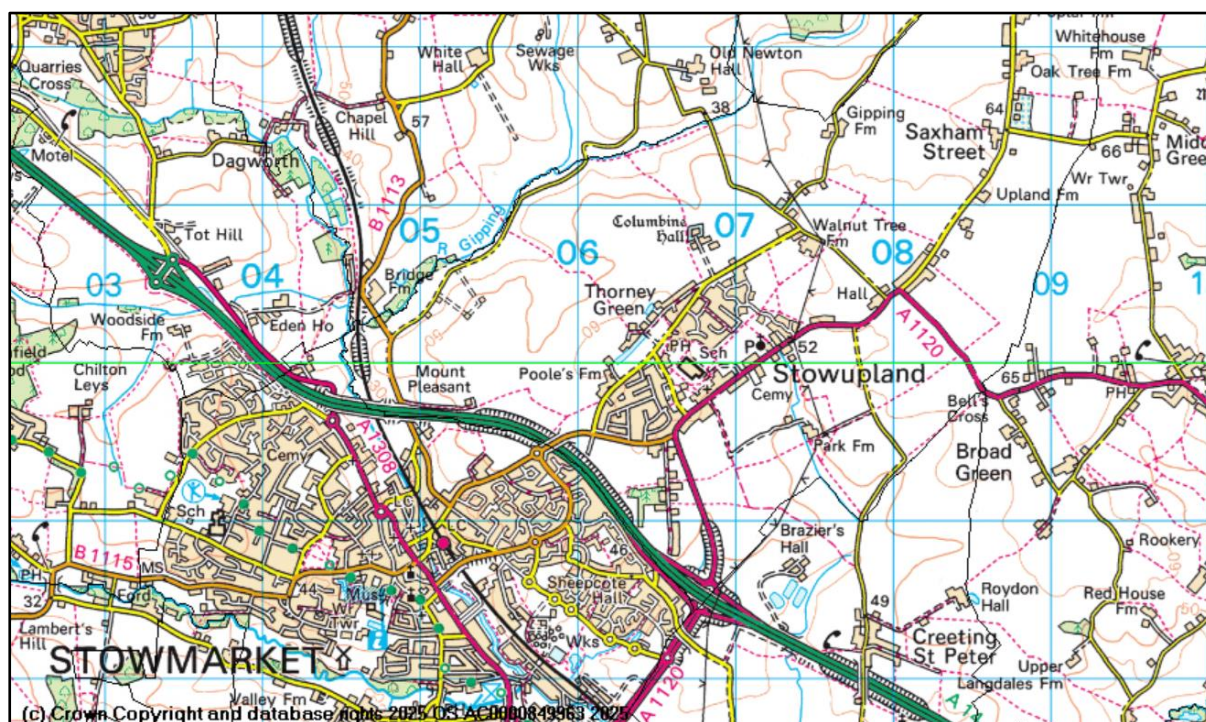


Figure 2. Investigation area map

The Environment Agency has permissive powers to carry out maintenance, improvement or construction work on main rivers to manage flood risk. The Internal Drainage Boards (IDBs) have similar permissive powers but instead work on ordinary watercourses within their board area.

Lead Local Flood Authorities (LLFAs) and Internal Drainage Boards (IDBs) manage the flood risk from ordinary watercourses but responsibility for maintaining watercourses rests with the Riparian landowner, defined as those who have a river, stream or ditch which runs next to or through their land or property.

Figure 3 below, shows the most significant watercourses in and around Stowupland.

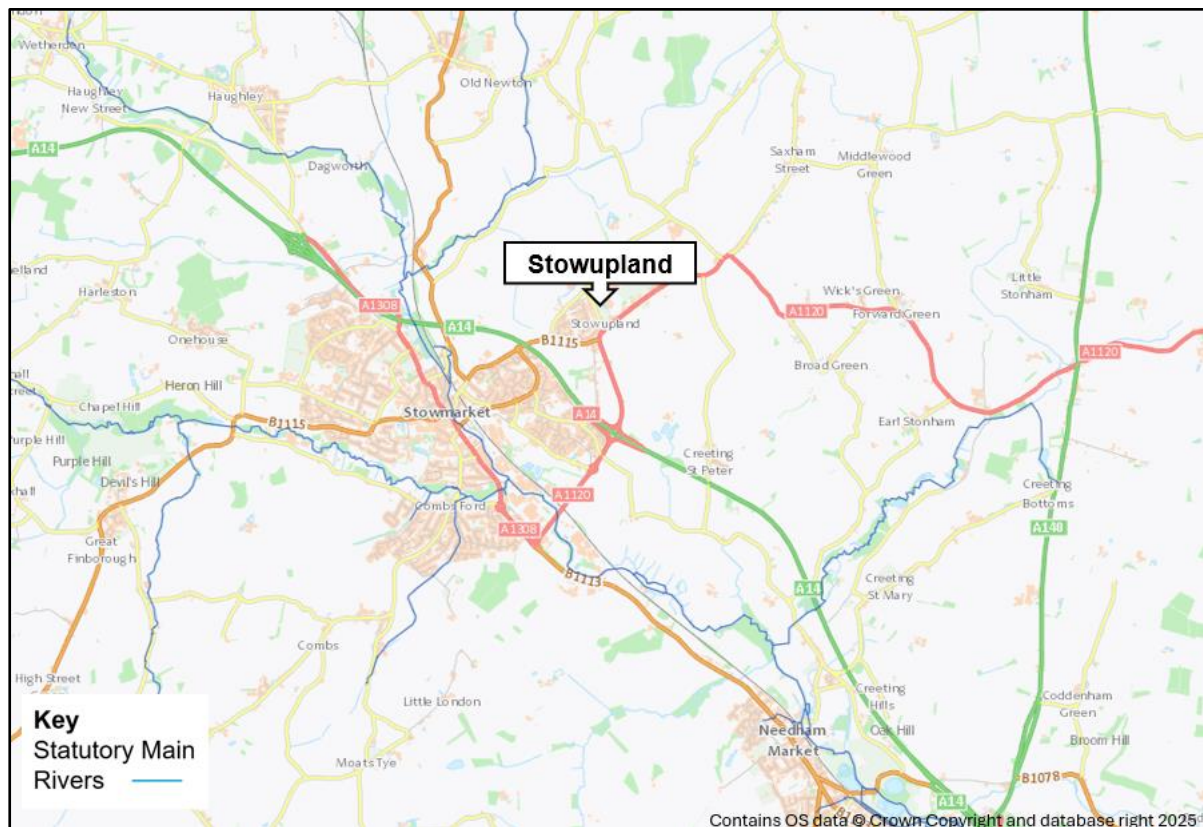


Figure 3. Location of statutory main river and ordinary watercourses

On the 20th of October 2023, Storm Babet resulted in significant rainfall in Suffolk on top of an already wetter than average October. This caused internal flooding to residential and commercial properties across the county from various flooding sources. Stowupland was affected with six properties reporting internal flooding. Flood water was described as coming from multiple sources including surface water runoff from surrounding fields and highways (pluvial) and the overtopping of local watercourses (fluvial) and overwhelmed drainage systems. Within this report, the term 'flood water' may be used to describe all types of flooding.

For the purposes of this investigation, the areas affected by flooding have been separated into two distinct locations (see Figure 4). The locations are as follows:

1. Saxham Street
2. Thorney Green Road

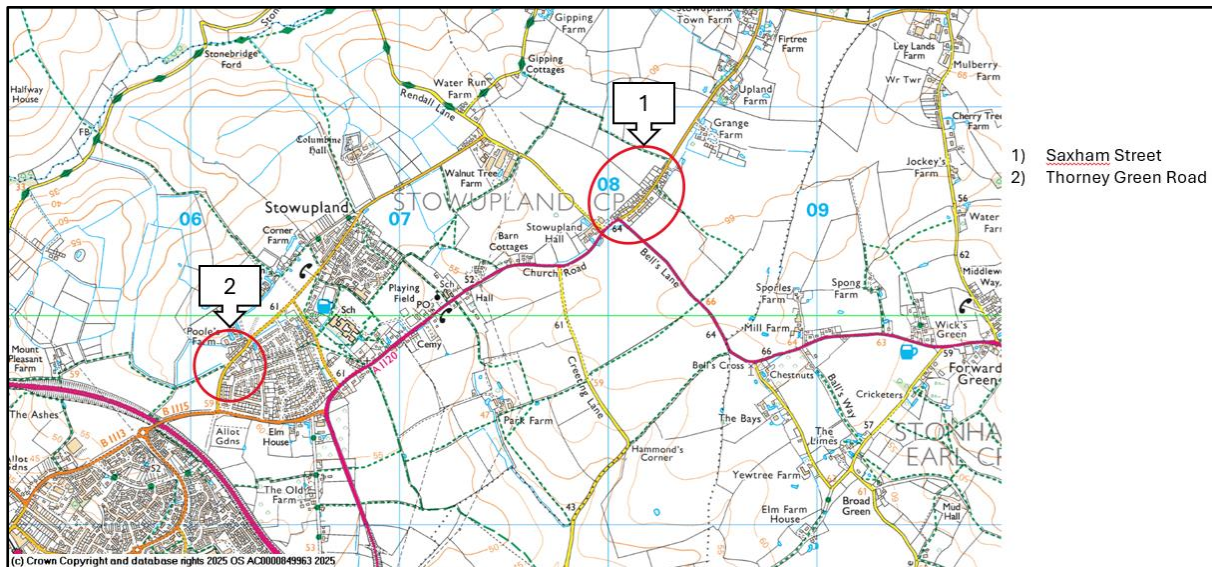


Figure 4. Distinct flood zones

3. Records of any historical flooding

A review of Suffolk County Council's Highways reporting tool, local and social media reports indicated previous accounts of internal property flooding in Saxham Street and Church Road.

The Environment Agency hold no historical information of reports of flooding in the area.

Anglian Water has no reports of internal flooding in Stowupland.

4. Predicted Flood Risk

Several areas of Stowupland are projected to be at significant risk of pluvial (surface water) flooding. This includes the areas of property which were internally flooded in Saxham Street and Thorney Green Road, although the most concentrated area of surface water flood risk in the village is projected to be in the vicinity of the primary school on Church Road.

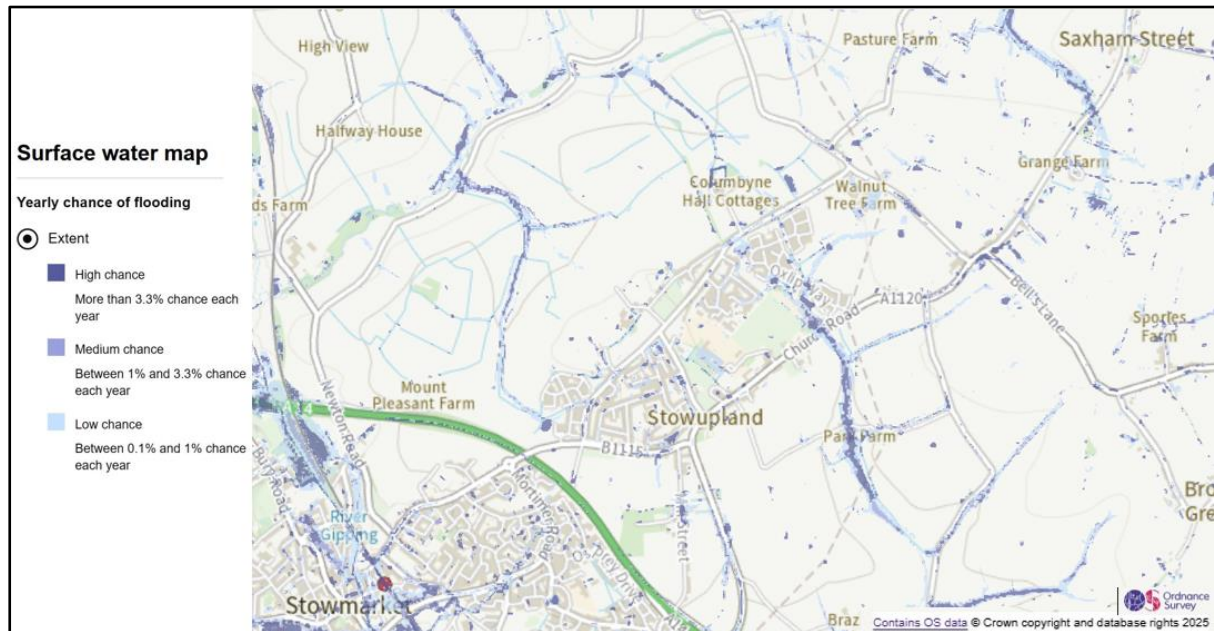


Figure 5. Predicted flood risk from surface water (pluvial)

Figure 6 shows the projected fluvial (from designated main river and ordinary watercourses) flood risk in Stowupland. There is no projected fluvial flood risk in the areas of affected property in Stowupland.

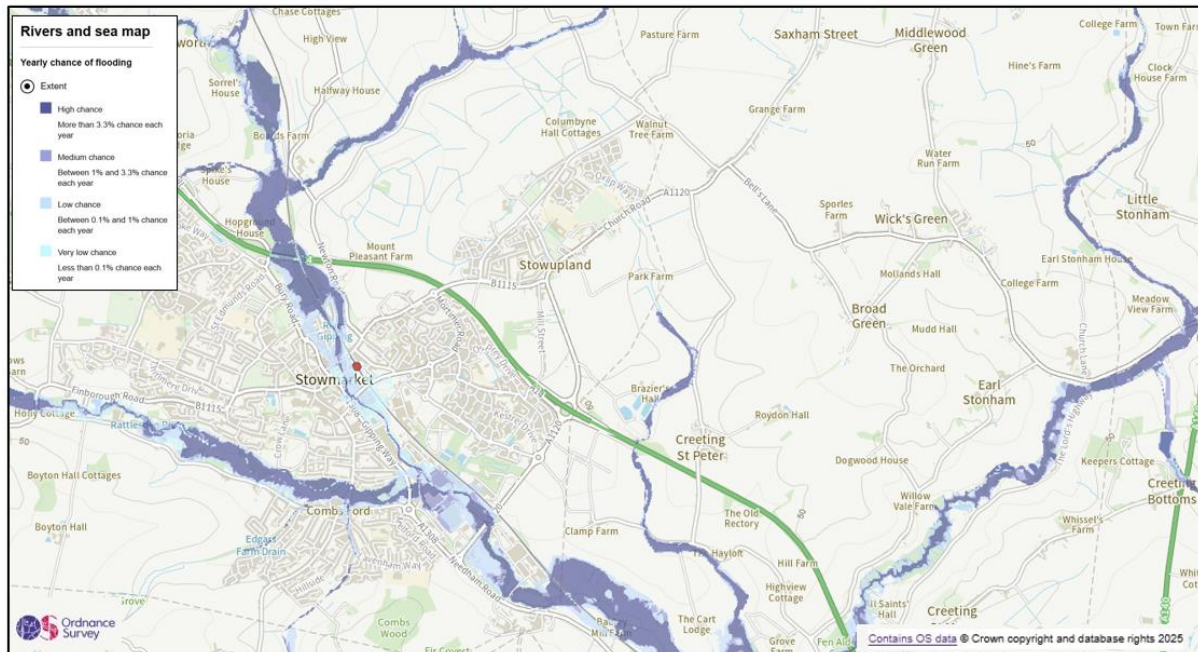


Figure 6. Predicted flood risk from river water (fluvial)

5. Catchment characteristics

The village of Stowupland is situated on higher ground, which is predominantly flat, or has a slight gradient (Fig. 7). The black line in Fig. 7 illustrates the approximate catchment boundary for the River Gipping gauging station in Stowmarket (35008) and marks the highest elevation. The area north of the boundary drains towards the River Gipping upstream of the gauging station. The villages of Stowupland and Saxham Street are in a rural location, with land used mainly for arable crops and some pasture.

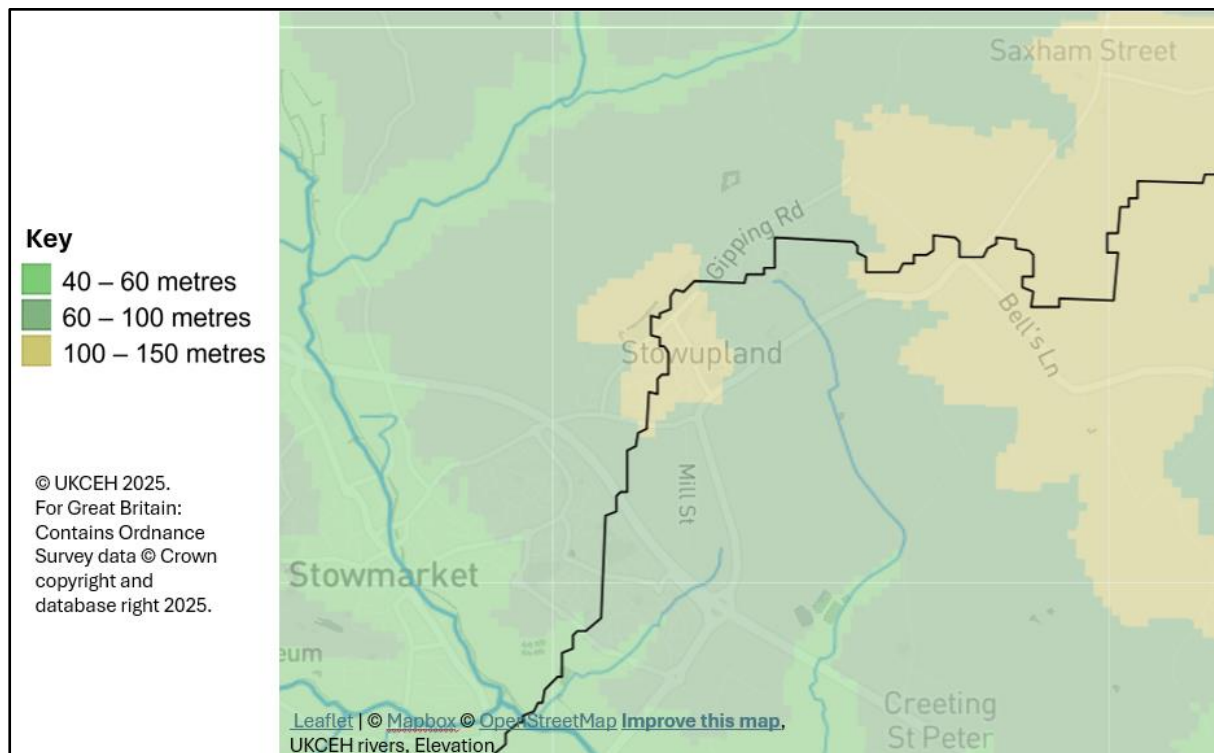


Figure 7. Elevation (NRFA)

The soils surrounding Stowupland are loamy and clayey with impeded drainage, or slowly permeable, meaning that water penetrates the ground more slowly, and surface water runoff is greater, particularly during intense rainfall (Fig. 7). However, the saturated nature of the soils leading up to the event would also have prevented some infiltration.



Figure 8. Soil map (LandIS® Soils)

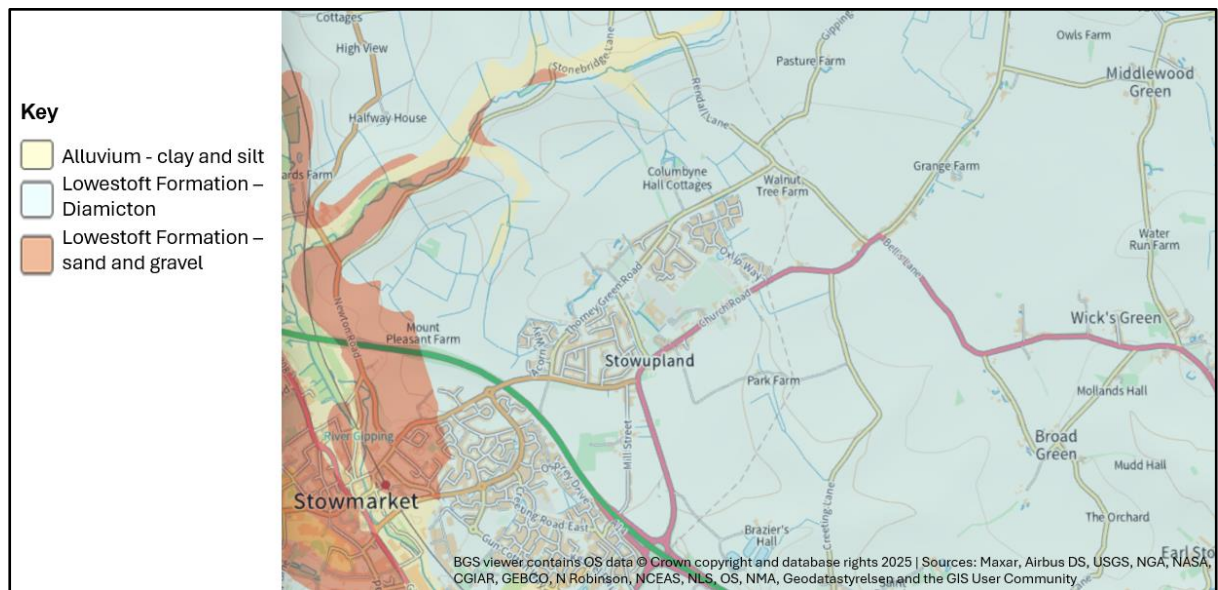


Figure 9. Superficial Geology (BGS Viewer)

Lowestoft Formation ‘Diamicton’ surrounds Stowupland which is described by the British Geological Survey as a diverse mixture of clay, sand, gravel, and boulders varying widely in size and shape. This generally has a low permeability, meaning water will tend to flow off it before it can infiltrate.

Flooding Source(s), Pathway(s) & Receptor(s)

Storm Babet was an extreme event which came at a time when Suffolk had experienced a significant amount of rainfall in the preceding weeks.

Data from surrounding Environment Agency rain gauges indicates that a significant volume of rain was experienced during Storm Babet. The nearest rainfall gauge to Stowmarket is Great Finborough. It recorded 51.4mm of rainfall on 20th October 2023, of which 49.2mm fell by 3.30pm.

The Environment Agency issue two types of warning when flooding is possible from a main river. These are:

1. Flood Alert – Flooding is possible. Be prepared. - usually issued between 2 and 12 hours before flooding.
2. Flood Warning - Flooding is expected. Immediate action required – usually issued 30 minutes to 2 hours before flooding.

Stowupland is not covered by the Environment Agency Flood Warning Service.

The description of the flood events described below will discuss the probable sources of flooding, the observed flow paths through the community and the receptors which have been affected. The term 'flood water' may be used to describe both fluvial (water from a watercourse) and pluvial (surface water run-off) flooding. This section has been prepared using reports submitted to Suffolk County Council via the online Highways Reporting Tool, community data and site visits.

Detailed descriptions of each investigation area can be found below.

1. Saxham Street

Five properties are reported to have internally flooded on the southeast side of Saxham Street. Two affected properties were projected to be at high risk of surface water flooding, two at medium risk and one at low risk. None were projected to be at risk of fluvial (river water) flooding. It should be noted that a projected low chance of flooding indicates a flood risk during more extreme events, such as Storm Babet.

Drainage in the highway was reported to be blocked and surcharging, preventing flood water on the highway from draining away. This flood water flowed towards property on the southeast side of Saxham Street, particularly properties with lower-level driveways. (This pattern was repeated during Storm Ciarán, when SCC Highways closed the road. Flooding was exacerbated by motorists removing temporary signs and causing wash to enter property). A significant proportion of the highway gullies in the vicinity of affected property were reported to be non-operational during cyclical maintenance after Storm Babet. These merit further investigation for potential blockages. Surface water flows into the sewage system caused the capacity of the

sewage pumping station in Stowupland to be exceeded, causing toilets to back up in affected property.

Surface water also flowed west from fields towards the rear of affected property, particularly those at lower levels. Ditches at the rear of impacted property were reported to be overflowing and unmaintained. (Subsequently, a new section of ditch has been constructed in the field at the rear of affected property, with a buffer zone in between the ditch and property). This flood water merged with water from the highway. Due to the extreme rainfall conditions, the design capacity of the wider drainage system would have been exceeded, even if fully functioning. In addition, the relatively flat nature of the area surrounding affected property and the clay soils and superficial geology reduced the rate at which floodwater was able to drain away or infiltrate.

Internal floodwater levels in affected property were reported to have reached 30cm. Flooding had receded by mid-morning on the 21st October.

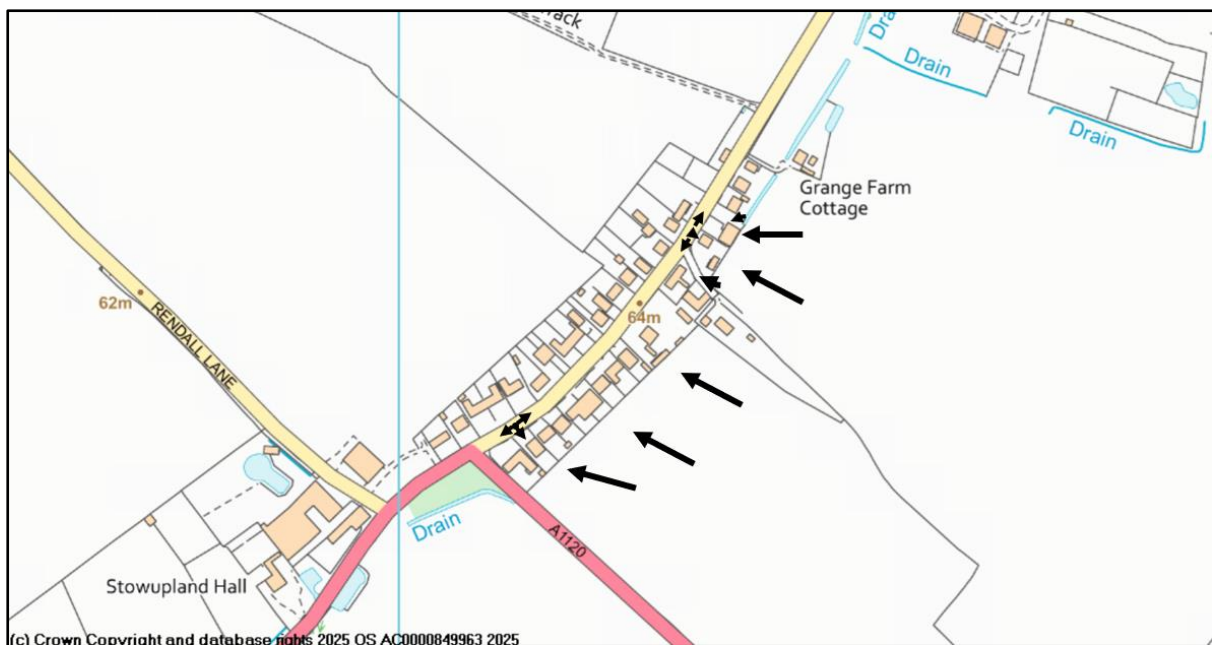


Fig. 10. Approximate floodwater flow paths, Saxham Street

In summary:

- Intense and prolonged rainfall caused floodwater to flow west from fields towards the rear of affected property in Saxham Street.
- The field drainage system at the rear of property exceeded capacity.
- The drainage system in Saxham Street surcharged in the highway and floodwater flowed towards the front of affected property.
- The sewage system was reported to have backed up inside affected property.
- The flat nature and geology of the affected area reduced the ability of flood water to drain away quickly.

Recommended actions:

- Residents to install Property Flood Resilience (PFR) measures.
- SCC Highways to investigate potential blockages of gullies on Saxham Street in the vicinity of affected property.
- Suffolk Highways to ensure the completion of highway drainage asset cyclic maintenance on Saxham Street.
- Landowners to carry out watercourse maintenance to reduce flood risk as necessary in accordance with their riparian responsibilities.

2. Thorney Green Road

One property was reported to have internally flooded in this area. Affected property on the east side of Thorney Green Road was projected to be on the edge of a high risk area of surface water flooding and at no risk of fluvial (river water) flooding.

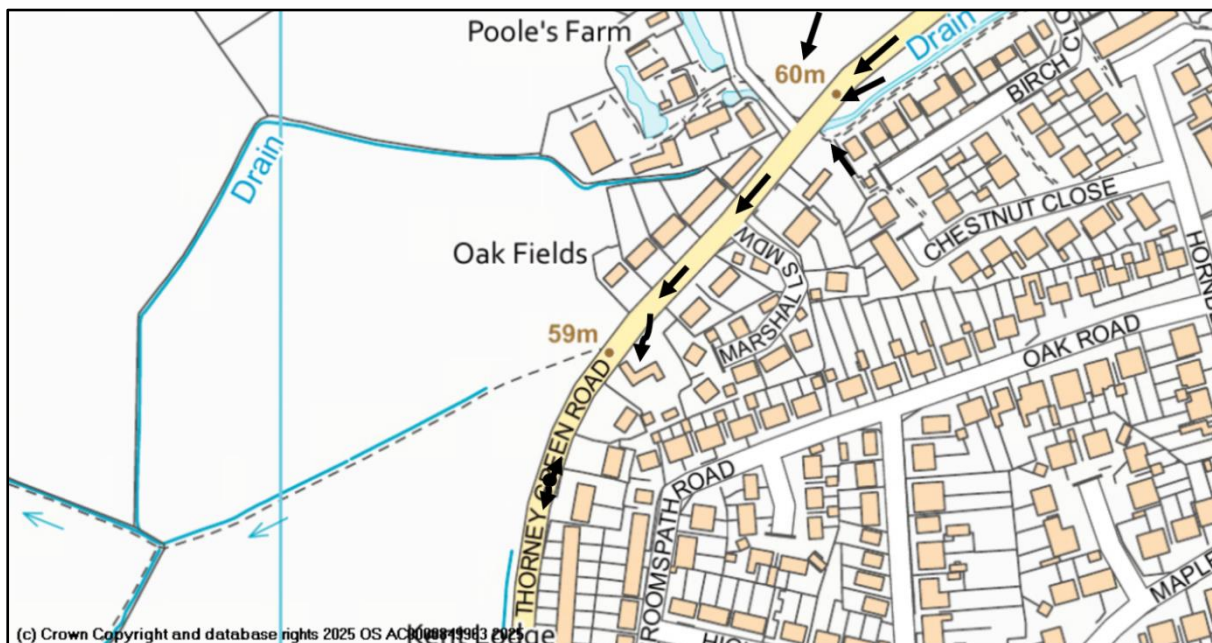


Figure 11 Approximate floodwater flow paths, Thorney Green Road

Surface water flowed southwest down Thorney Green Road, entering a lower-level driveway and flowing towards impacted property. Historic ponds on the south side of affected property have been removed, reducing the surface water storage capacity in the vicinity. Surface water which had entered the highway drainage system further north on Thorney Green Road surcharged through a manhole on the highway to the south of affected property, due to the drainage system exceeding capacity in the extreme rainfall conditions. All these sources of floodwater merged to affect property in the vicinity.

In summary:

- Flooding was reported to have resulted from surface water flowing from the highway.
- Manholes were shown to be surcharging in the vicinity of affected property due to extreme rainfall conditions.

Recommendations:

- Residents to install Property Flood Resilience (PFR) measures.
- SCC Highways to investigate highways drainage capacity (medium term)
- SCC Highways to implement highways drainage capacity improvements if beneficial and viable (long term).

Risk Management Authorities, Non-Risk Management Authorities and flood risk functions

Risk Management Authority	Relevant Flood Risk Function(s)
Suffolk County Council	Lead Local Flood Authority, Highways Authority & Asset Owner
Environment Agency	Lead organisation for providing flood risk management under its permissive powers and warning of flooding from main rivers
Anglian Water	Asset Owner
Mid Suffolk District Council	Local Planning Authority & Asset Owner
Non-Risk Management Authority	Relevant Flood Risk Function(s)
Private Landowners	Riparian responsibilities for watercourses
Private residential and commercial landowners	Riparian Responsibilities and improving flood resilience to property
Stowupland Parish Council	Manage flood risk at a community level, prepare and produce flood action plans and maintain watercourses where present on land they own.

Action(s) completed to date:

The following section acknowledges actions that RMA's and Non-RMAs have implemented or are currently in progress since Storm Babet and prior to publishing of this report.

Action	Responsible Party	Progress
Offer of £5k Property Flood Resilience (PFR) grant funded scheme to eligible properties that flooded during Storms Babet	Suffolk County Council Lead Local Flood Authority (LLFA)	Application window now closed. Installation of PFR measures on approved applications has been extended to December 2025.
Ensure riparian landowner responsibilities are understood with regard to watercourse management in Stowupland	SCC LLFA	SCC published " Flood Smart Living " online and hard copy guide to increasing flood resilience for residents, landowners and communities, December 2024

LLFA Recommended Action(s):

The following section provides a range of flood mitigation measures that could be implemented to reduce the risk of flooding in Stowupland. They have been derived from data and evidence collated as part of the report and have been included having been considered realistic in their implementation. The implementation of actions falls to the responsible party. Progress on the action will be monitored by Suffolk County Council but it should be acknowledged that the council has limited powers to enforce the implementation of recommended actions.

Action	Responsible Party	Timescale for response	Latest Progress Update for Actions
Short Term Actions (e.g. standard maintenance activity and initial investigation of options that can be undertaken with limited need for forward planning)			
Establish a Community Emergency Plan that includes plans to manage future flood events –Liaison with Suffolk Joint Emergency Planning Unit	Stowupland Parish Council	6 months	
Residents to consider installing Property Flood Resilience (PFR) measures to property to reduce damage caused by flooding.	Residents	N/A	DEFRA PFR Grant has now closed for new applications. Installation of PFR measures on approved applications has been extended to December 2025. Further information on PFR measures can be found within SCC published “Flood Smart Living” handbook. There are currently no active PFR schemes being managed by the LLFA in Suffolk.
Suffolk County Council Highways to investigate condition and potential blockages of highway drainage system on	SCC Highways Authority	6-12 months	

Saxham Street in the vicinity of affected property.			
Suffolk Highways to ensure the completion of highway drainage asset cyclic maintenance on Saxham Street.	SCC Highways Authority	6-12 months	
Medium Term Actions (e.g. longer planning timescales and potential need to source funding but potential for greater impact)			
Investigate highways drainage capacity to manage surface water flows in the vicinity of affected property in Thorney Green Road	SCC Highways Authority	12-24 months	
Long Term actions (significantly longer timescale and budget required with potentially greater positive impact)			
Deliver improvements to highway drainage network in the vicinity of affected property in Thorney Green Road to manage surface water flows if investigation works suggest it is beneficial and viable.	SCC Highways Authority	TBC	
Deliver any capital Interventions that are economically, technically and environmentally feasible and acceptable to improve the flood resilience.	Landowners, supported by relevant authority, resource dependant (SCC LLFA, EA)	TBC	

Approval

This report will be reviewed and updated every 6 months until actions are marked as complete.

Reviewer	Date of Review

Disclaimer

This report has been prepared and published as part of Suffolk County Council's responsibilities under Section 19 of the Flood and Water Management Act 2010. It is intended to provide context and information to support the delivery of the local flood risk management strategy and should not be used for any other purpose.

The findings of the report are based on a subjective assessment of the information available by those undertaking the investigation and therefore while all reasonable efforts have been made to gather and verify such information may not include all relevant information. As such it should not be considered as a definitive assessment of all factors that may have triggered or contributed to the flood event. Should there be additional information available to develop the report, please email to floodinvestigations@suffolk.gov.uk

The opinions, conclusions and recommendations in this Report are based on assumptions made by Suffolk County Council when preparing this report, including, but not limited to those key assumptions noted in the Report, including reliance on information provided by third parties.

Suffolk County Council expressly disclaims responsibility for any error in, or omission from, this report arising from or in connection with any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the time of preparation and Suffolk County Council expressly disclaims responsibility for any error in, or omission from this report arising from or in connection with those opinions, conclusions, and any recommendations.

The implications for producing Flood Investigation Reports and any consequences of blight have been considered. The process of gaining insurance for a property and/or purchasing/selling a property and any flooding issues identified are considered a separate and legally binding process placed upon property owners and this is independent of and does not relate to Suffolk County Council highlighting flooding to properties at a street level. Property owners and prospective purchasers or occupiers of property are advised to seek and rely on their own surveys and reports regarding any specific risk to any identified area of land.

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