Section 19 Flood and Water Management Act 2010

Debenham Flood Investigation - Storm Babet October 2023

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Date Published		31/07/2024
Date Report Closed		

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Executive Summary

Storm Babet caused significant disruption to communities across Suffolk between 18th-21st October 2023. Debenham was one of the most severely impacted locations. Over 70 residential and commercial properties were internally flooded, and infrastructure and services were disrupted. 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; and
- make recommendations for actions by relevant responsible organisations, landowners or homeowners.

Debenham is located in an area at significant risk of both fluvial (river) and pluvial (surface water) flooding and the nature of the surrounding topography and geology contributes to the susceptibility of the town to flooding. Steep rural catchments flow into the noticeably shallower urban centre and local geology and soils are characterised as having low permeability and high run off, making a high number of properties in the village vulnerable to flooding due to intense rainfall events. Storm Babet delivered significant rainfall in the River Deben catchment, following an extended period of above average rainfall.

Impacts within the village were widespread and for the purposes of this report, the affected areas have been categorised into nine distinct zones. 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. Environment Agency, District Council) 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 Debenham was severely impacted by flooding due to the intensity of rainfall, that overwhelmed the five natural flow routes and the design capacity of existing drainage infrastructure. This situation was compounded when these flow routes converged with the River Deben which was also in flood and saw the resultant internal flooding of property, infrastructure, and services.

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 Debenham. For short term measures, key highlights include the implementation of community flood plans, maximising Property Flood Resilience (PFR) grants, removal of blockages within watercourses and drainage infrastructure, as well as improvements to flood warning systems and the sensitive management of land. For medium to longer term recommendations, there is emphasis of the investigation of potential improvements to drainage infrastructure and the creation of new natural flood management features, to reduce flood risk within the catchment.

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 in a short space of time 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 measuring 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 Suffolk's Joint Emergency Planning Unit (JEPU), in the afternoon of the 20th of October due to significant disruption to travel and high number of flooded communities.

The following maps illustrate the average rainfall in East Anglia between July and October 2023 against the historical average monthly rainfall.

July August September October Key

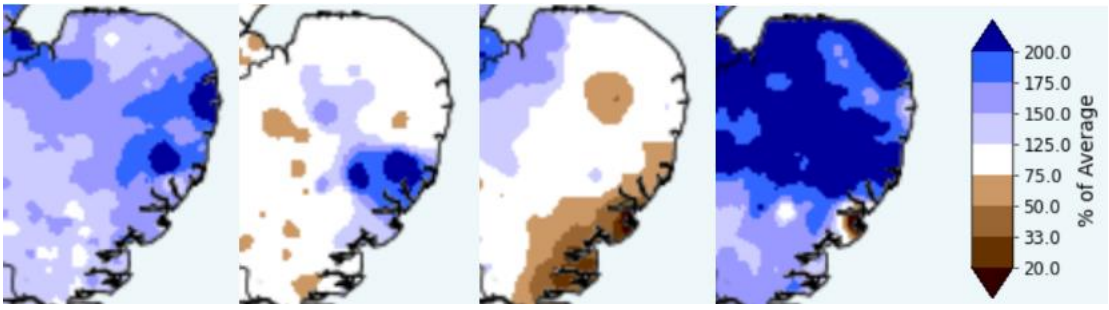

Figure 1 – Average rainfall in East Anglia between July and October 2023

The following report acknowledges that October 2023, and particularly Storm Babet, was an extreme event and will assess the likely 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 regular 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

Debenham is a village set in the Mid Suffolk district of East Anglia. It is located approximately 13 miles north of Ipswich and 3 miles east of the A140. See Figure 2.

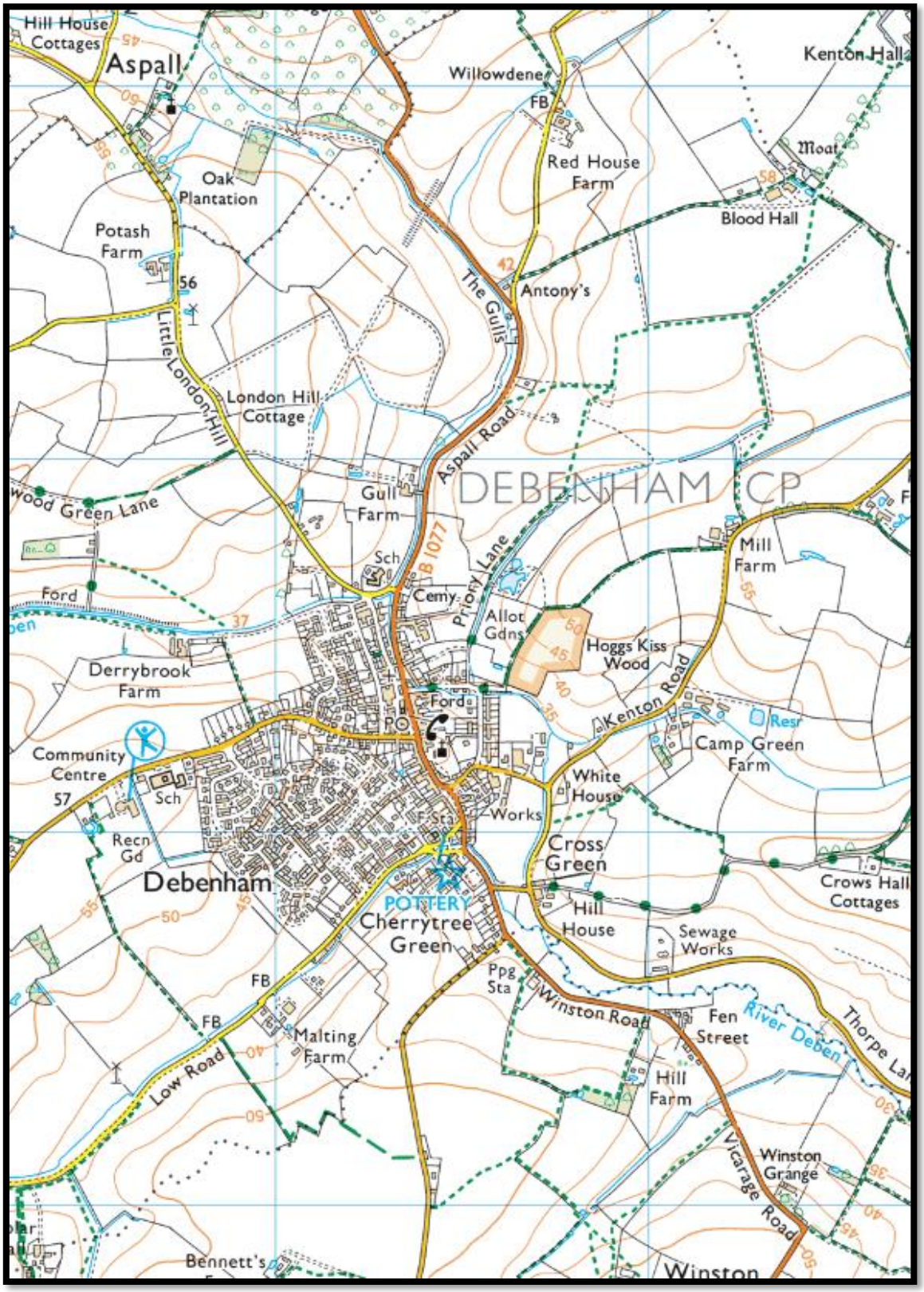

Figure 2 – Investigation Area Map

On the 20th of October 2023, Storm Babet resulted in, significant rainfall across Suffolk on saturated ground due to above average rainfall in the preceding weeks. This caused internal flooding to properties, residential and commercial, across the county from various flooding sources. The following report is focused on Debenham and the surrounding areas and will discuss the probable flooding sources, the observed flow paths through the community, and the receptors which have been affected.

Debenham was significantly impacted, with over seventy properties reporting internal flooding. Much of the flood water approached Debenham from fluvial (water from a designated main river), pluvial (surface water run-off) sources and both combined. For the purposes of this report, the term ‘flood water’ may be used to describe both fluvial and pluvial flooding.

There are three major tributaries of the river Deben that flow into Debenham; the Aspall Watercourse; Cherry Tree Brook and Derry Brook as shown on the map in figure 3. The Aspall watercourse has a water level gauge, monitored by the Environment Agency, and is used to enable the issuing of flood warnings to residents at risk of fluvial flooding. During Storm Babet, the Flood Warning was issued but this gauge did not register the flood warning trigger level before flooding was experienced within the community. It was instead issued in response to incoming information. Consequently, properties in Debenham were flooded before a warning was issued to residents. An explanation as to why this occurred can be coincided with the intensity of rainfall and significant overland flood flows, separate to the Aspall watercourse. This caused a rapid rise in flood waters within Debenham before the trigger level was reached on the Aspall Watercourse.

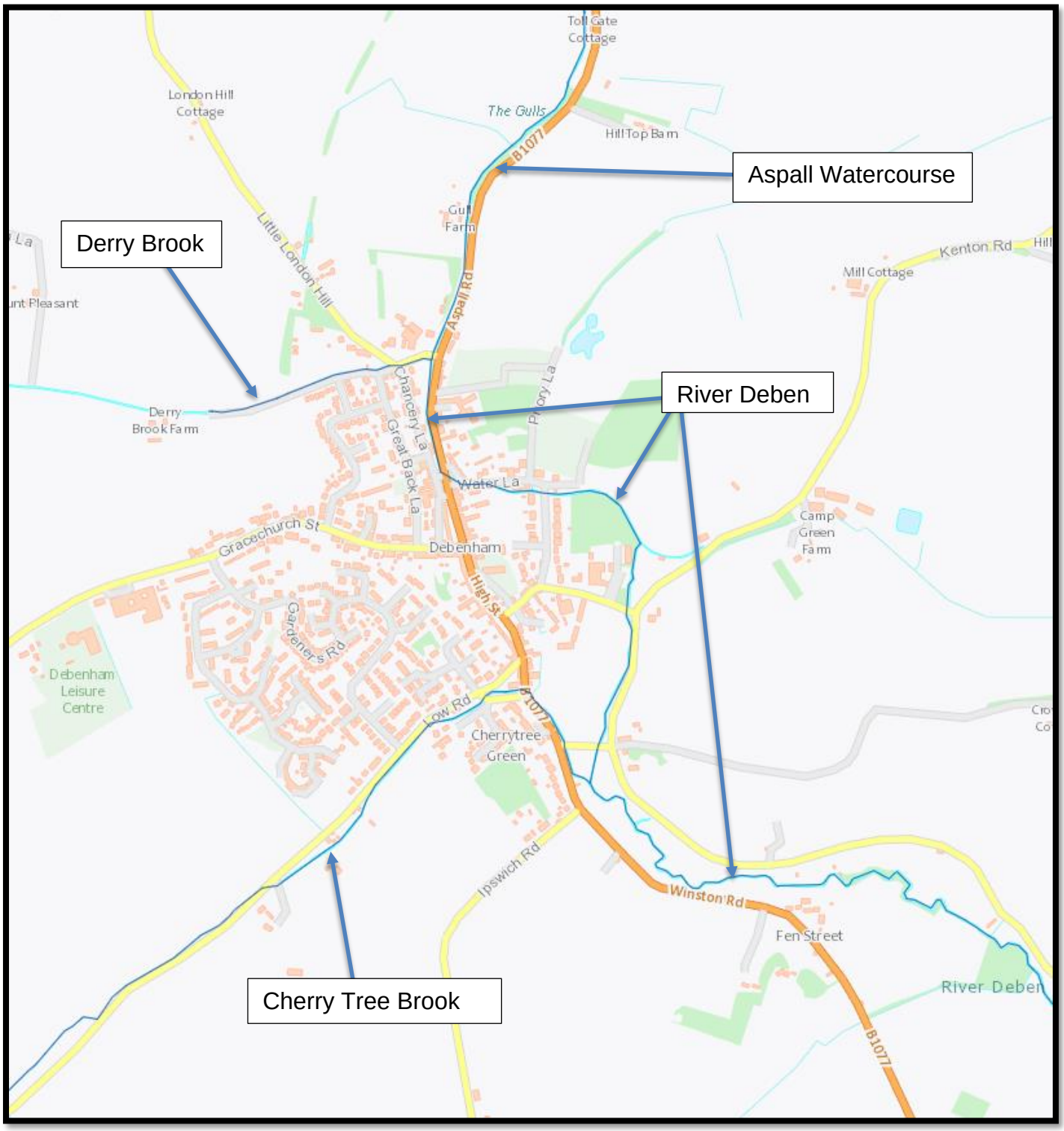

Figure 3 – Map of River Deben and its surrounding tributaries in Debenham

For the purpose of this investigation, the affected areas have been broadly categorised into 9 distinct zones (Figure 4), which the report will investigate in more detail. The zones are as follows:

a. Bellwell Lane
b. Chancery Lane & Aspall Road
c. Hitcham Road, The Butts, Great Back Lane & Derry Brooke Lane

d. Water Lane, Priory Lane, Cross Green & Meadow Works Business Park
e. High Street & River Close
f. Kenton Road
g. Low Road & Cherry Tree Lane
h. Gracechurch Street & Henry Street
i. Fenn Street

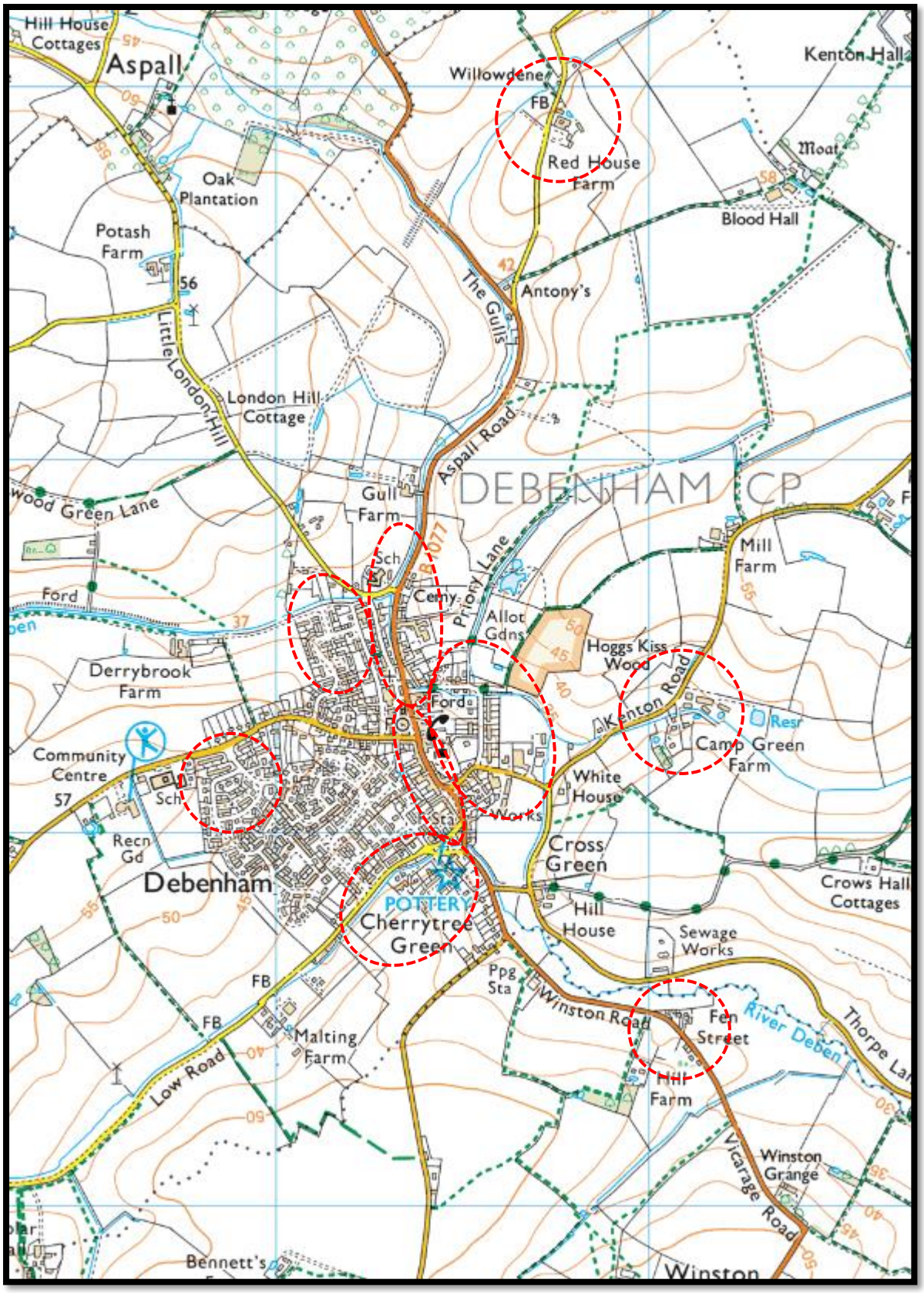

Figure 4 – Investigation Area Map with Zones

3. Records of any historical flooding

According to information taken from a report commissioned by the Environment Agency in 2014, many significant flood incidents have been recorded in Debenham, including in 1936, 1937, 1944, 1947, 1956, 1968 and 1993. Historic flooding appears to have been driven by high levels on both the River Deben and Cherry Tree Brook, with significant flood depths recorded in Market Square, Water Lane, Priory Lane, south of the High Street near the fire station and at Cross Green. (JBA Consulting and Environment Agency , 2014)

The intensity of the rainfall during these events appears not to have been recorded so it is hard to make a comparison with Storm Babet. However, similar areas and roads were reported to have been affected.

4. Predicted Flood Risk

Debenham is identified as being at significant flood risk from more than one source of flooding, and this is demonstrated in the following mapping information.

Fluvial flood risk (from designated Main Rivers) is evident in the village. The River Deben runs through this catchment and the map shows Chancery Lane, Aspall Road, Water Lane, Priory Lane, High Street, Kenton Road, Low Road are all at risk of flooding from fluvial sources with Aspall Road, Derry Brook Lane, Water Lane, and Low Road in high-risk areas. See Figure 5.

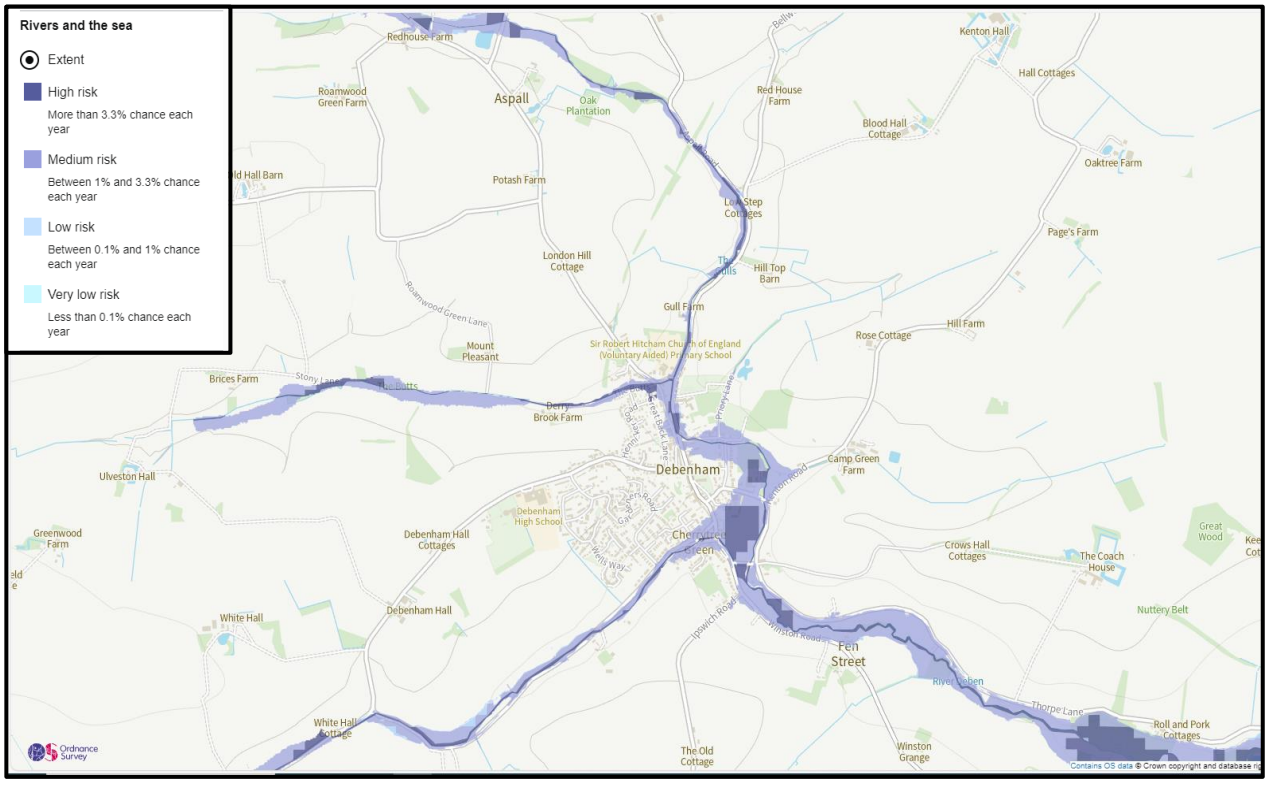

Figure 5 - Predicted Fluvial Flood Risk

Debenham is also at risk from pluvial flood risk (surface water run-off from surrounding land and ditches), with Chancery Lane, Aspall Road, Water Lane, Priory Lane, High Street, Kenton Road and Low Road all shown as at risk for flooding. See Figure 6.

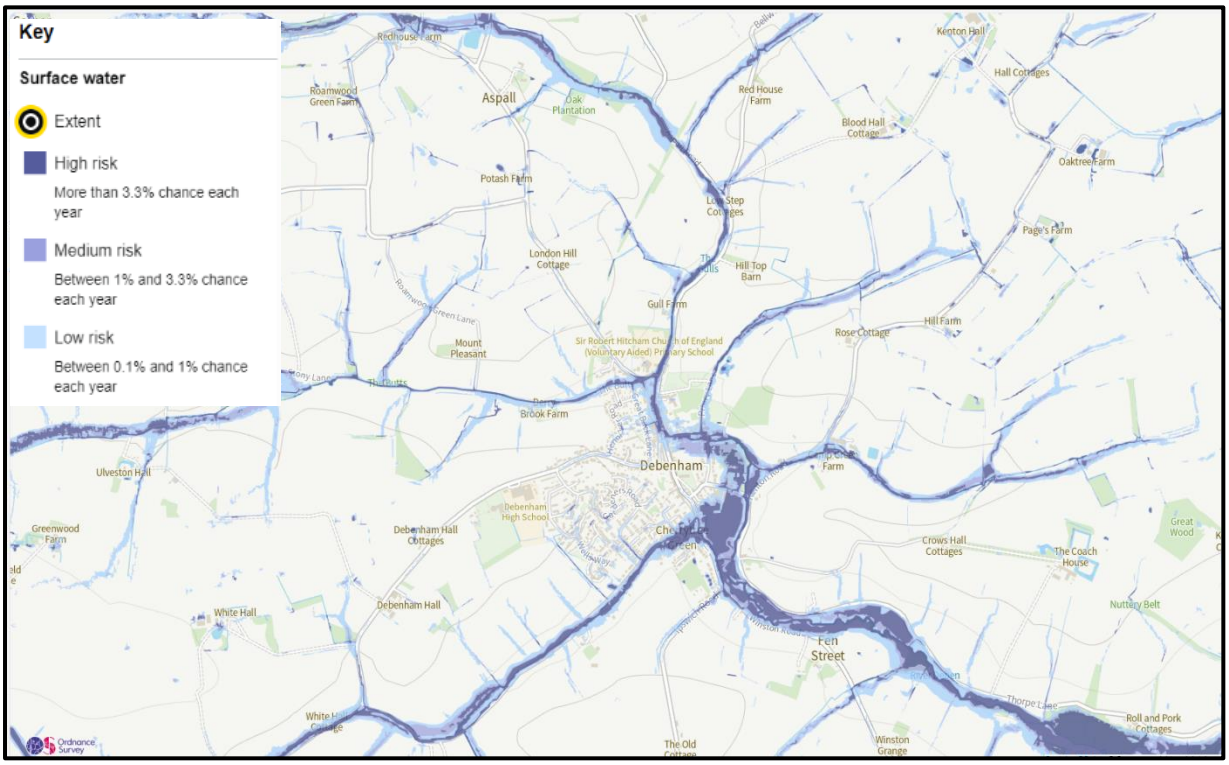

Figure 6 - Predicted Pluvial Flood Risk

5. Catchment characteristics

Areas of Debenham are low-lying with reasonably steep surrounding topography. The River Deben runs through the middle of the valley in which Debenham is situated and flows out of the catchment to the south-east.

There are 5 major flow routes for water to travel into Debenham. They originate in the upper catchment where the gradient is steep before flowing into Debenham where the gradient is noticeably shallower. The 5 major flow paths converge on the River Deben as it flows through the village in a southerly direction. Debenham village therefore acts as attenuation during intense rainfall events, retaining flood water until it is able to discharge along the River Deben to the south of the village. Overwhelmed infrastructure and watercourses will be observed during significant storm events.

Figure 7 shows the topography of Debenham and the surrounding areas with the 5 main flow paths into the village and the River Deben, shown with directional arrows. The watercourses from the west and north are large tributaries of the River Deben. There are fewer significant watercourses flowing into Debenham from the east and the flow path which enters Debenham from the east is predominantly surface water.

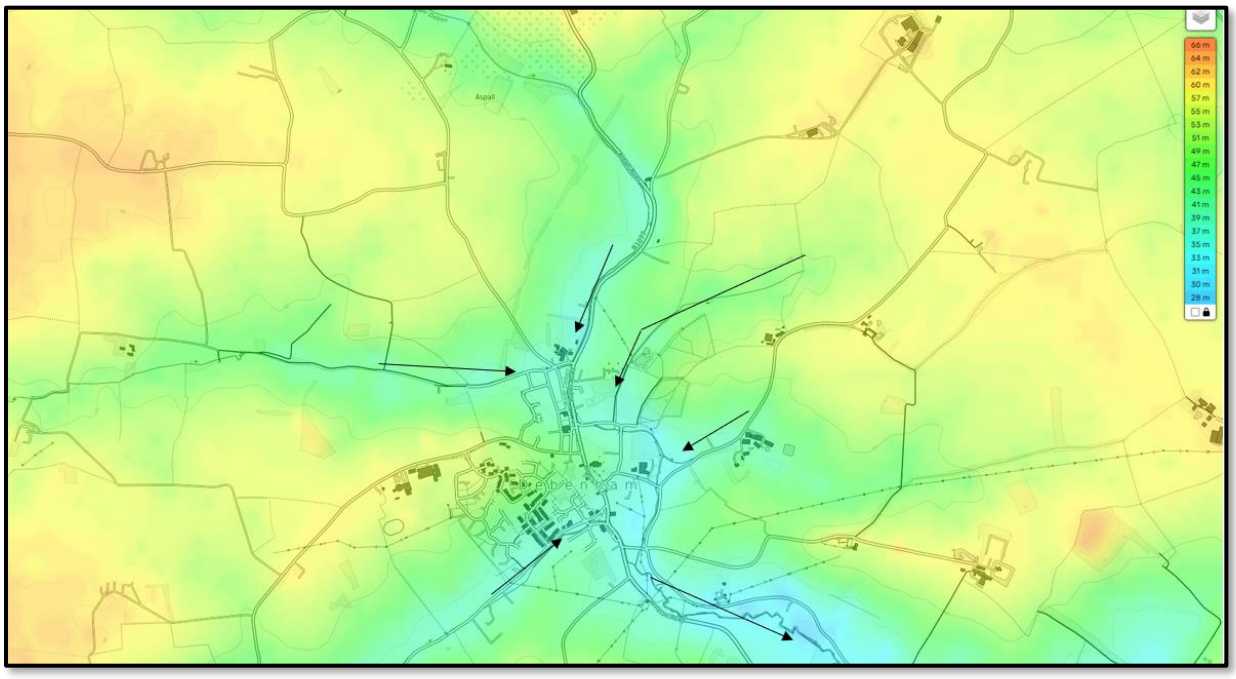

Figure 7 – Topographical map of Debenham

Figure 8 shows data from the British Geological Survey which supplies details of the bedrock geology and superficial geology of the area. (British Geological Survey, 2024)

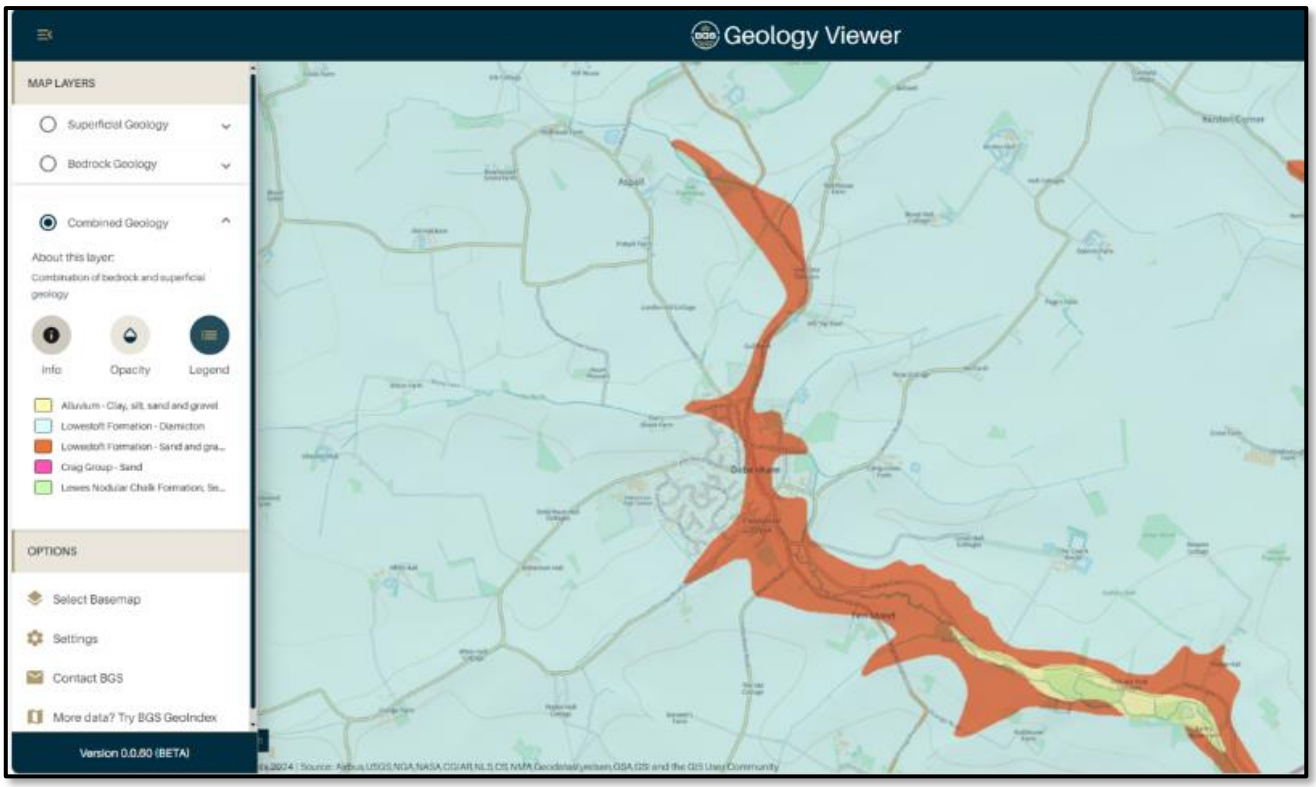

Figure 8 – Geological map of Debenham

The Geology surrounding Debenham shows that much of the area is made up of ‘Lowestoft Formation – Diamicton’ 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 is sometimes known as boulder clay. This soil generally has a low permeability meaning water will tend to flow off it before it can infiltrate, which reflects the reports collected during Storm Babet.

The area shown in orange in Figure 8 is also Lowestoft formation but is instead a mixture of sand and gravel deposits and generally follows the line of the river.

The soils immediately around Debenham are described as loamy and clayey soils with slightly reduced infiltration. At the higher levels surrounding the village, the soil is described as slowly permeable, seasonally wet, loamy and clayey soils with reduced infiltration (LandIS, Cranfield University, 2024)). Lower rates of infiltration to ground means that more surface water will stay on the surface and not be absorbed, potentially contributing to flood water during heavy rainfall events. See Figure 9.

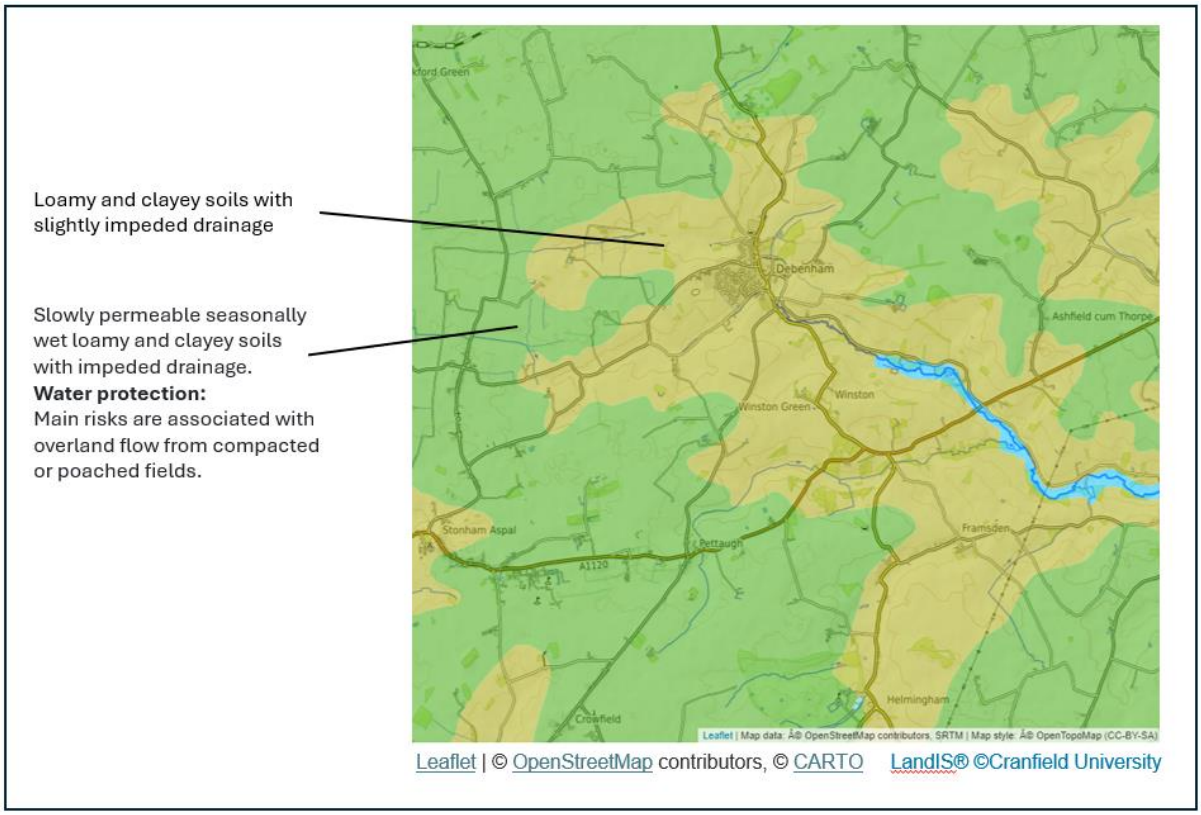

Figure 9 – Debenham and surrounding soils

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

The low-lying nature of Debenham with its several flow paths and low permeability of surrounding soils make it susceptible to flooding events in extreme rainfall. Storm Babet was an extreme event which came at a time when Suffolk had experienced a significant amount of rainfall in the preceding weeks.

An Environment Agency rain gauge in Saxmundham (approx. 15 miles east of Debenham) recorded 44mm of rainfall in a 12-hour period, where the average rainfall is 60mm for the entire month of October according to Met Office sources. (Met Office, 2020). At the Earl Soham gauge (approx. 4 miles east of Debenham), a similar scenario was observed, where the Rain Gauge recorded 68.49mm in 21 hours, with 50% of the rainfall (35.34mm) falling within a critical 3-hour period. The data recorded coincides with intensity of rainfall experienced, the speed of onset and the extent of flooding within Debenham.

The description of the flooding events outlined below has been prepared using reports submitted to Suffolk County Council via the online Highways Reporting Tool and information gathered by the Environment Agency. Some on-site images and measurements were recorded by Environment Agency Community Information Officers (CIO's) in the aftermath of Storm Babet.

A more detailed description of the key regions affected can be found below.

a) Bellwell Lane

Located north of the village, Bellwell Lane runs adjacent to an ordinary watercourse which travels under the road, through a culvert located approximately 2 kms north of the village centre. According to reports, the culvert in this area was overwhelmed early in the day due to the volume of water coming off the surrounding field network.

A small ordinary water course inflows from the east taking water from a large surrounding area. A site visit confirmed there to be three interconnecting watercourses in this area which appear to flow through a large box culvert under the highway. There appeared to be a significant level of silt in the culvert which may have influenced its functioning capacity during the event. Additionally, there is a headwall in the northern watercourse which does not appear to contain a pipe to continue the flow, either the pipe is buried under significant debris or there is not a pipe to convey the water. This headwall then effectively forces the water onto the highway at this point preventing its movement downstream in the watercourse.

The flows in this area continued down the path of the watercourse and on the road towards Aspall Road, eventually converging with the flood water in Debenham village. Reports suggest that a small number of properties on Bellwell Lane were flooded, which flooded previously in May 2023 potentially due to a blockage of the culvert under the highway.

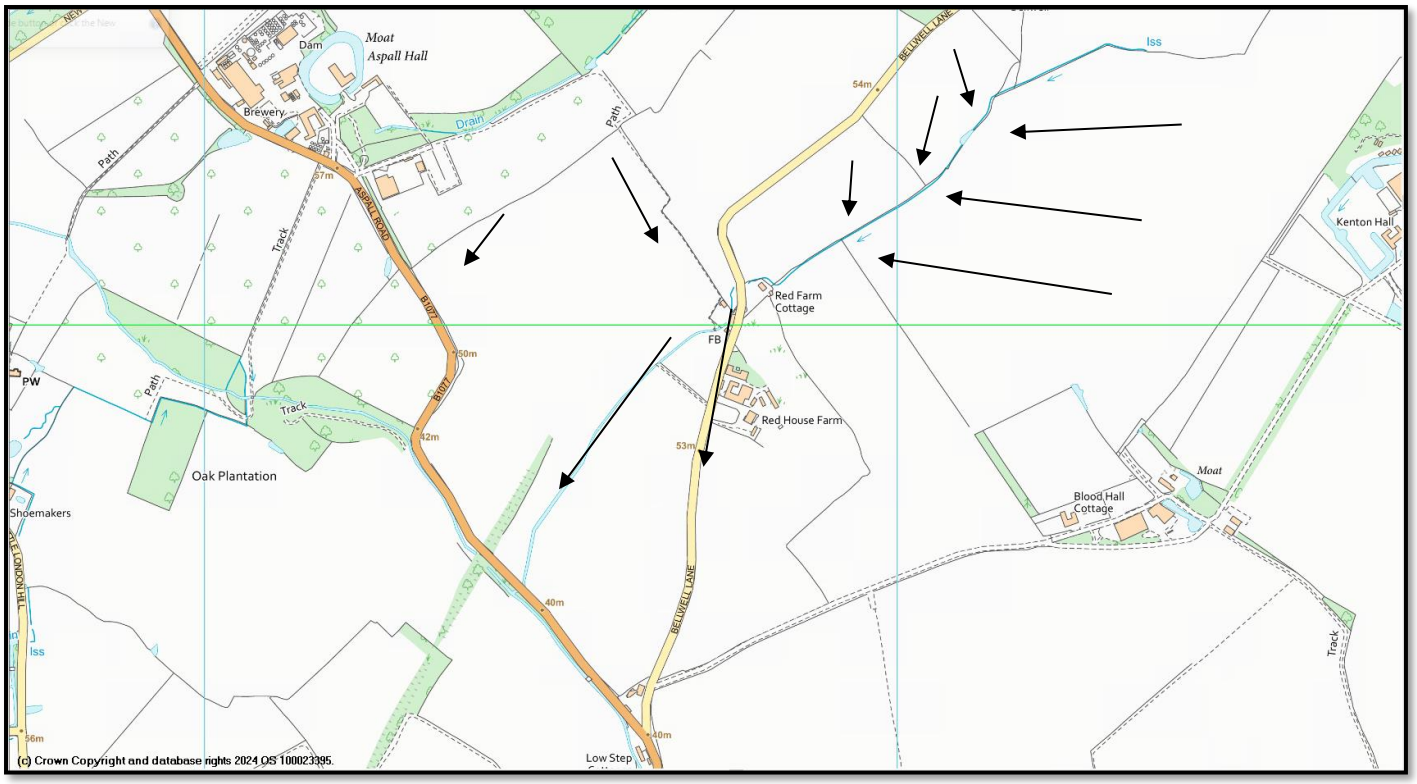

Figure 10 – Flow paths in northern Debenham

Conclusion:

- Drainage assets were overwhelmed beyond their capacity.
- Culvert under the road may have been blocked or not working correctly, resulting in impedance of flood water.
- Watercourse in area may have been blocked or not flowing at full capacity, resulting in impedance of flood water.

LLFA Recommended Action(s):

- Suffolk County Council Highways Authority to investigate possible blockage and silt build up in culvert located on Bellwell Lane.
- Riparian owner to carry out regular maintenance on watercourse to ensure a good flow of water.
- Investigate possibility of Natural Flood Management features on the west side of Bellwell Lane just to the south of where the culvert outfalls.

b) Chancery Lane & Aspall Road

Chancery Lane and Aspall Road are in the northern part of Debenham, with Aspall Road being one of the main routes into the village from the north and Chancery Lane running south of the primary

school. Reports from the area suggest that water flowed off fields surrounding Aspall Road, causing damage to the watercourse and road surface. This contributed to the flooding as a damaged bank of the watercourse allowed water to flow directly onto the road and into properties. Some reports indicated that the watercourse has not received regular maintenance which may have resulted in a reduction in the watercourse capacity. Following discussions with the Environment Agency it has been confirmed that a cut and clear vegetation clearance is carried out in this area once a year, normally in the autumn, in 2023, this was carried out in November.

The surrounding fields had recently been cultivated and information from the time of the event suggests this could have contributed to the funnelling of water into the watercourse and onto the road at a faster rate. The reports suggest that the cultivation had taken place leaving the resultant furrows traveling up and down the hill as opposed to across the line of the hill. Furrows traveling up and down the hill may have acted as very small channels, funnelling the water towards the highway and watercourses, whereas, had the furrows been across the line of the hill this may have helped to slow down the surface water runoff.

Witnesses suggest that the new development in the area did not have full attenuation basins and suggested possible run off from the development site contributed to the flood water. An investigation is ongoing through the Local Planning Authority following concerns raised about the water management strategy for this site not being followed. It should be noted that attenuation basins being partially empty, does not necessarily result in them not functioning as designed. Further information on attenuation basins and other SuDS features can be found on the Suffolk County Council Website.

The reports from Chancery Lane suggest the water was coming from the over topped Derry Brook and other nearby ordinary watercourses. Roads such as the ‘The Butts’ and ‘Chancery Lane’ effectively became secondary river flow paths for the Deben and its feeder watercourses. Information suggests that the river has not been maintained for some time which may have resulted in considerable vegetation growth, although as stated above, the Environment Agency have confirmed that a yearly cut and clear takes place which occurred in November of 2023, therefore at the time of the event, the vegetation had not been cleared for around a year. It is not normal practice for the Environment Agency to carry out this vegetation clearance before October in each year.

Reports from the southern end of Chancery Lane and Aspall road suggest sewage and oil were present in the flood water suggesting the sewerage system had become overwhelmed, and reports from the community suggest a home oil storage tank had slipped into the watercourse, possibly causing an additional blockage and leaking oil into the river.

The flow from the north, down Aspall Road and the adjacent watercourse, meets the main river Deben beside the road junction with the Butts, just south of the primary school. There is additional flow from Little London Hill and The Butts which travels in from the west. As a result of the overtopped river Deben, water flowed south down Chancery Lane and Aspall Road where it affected 25 properties across the two roads. Reports suggest internal water depths ranging from 5cm to 45cm, resulting in damaged properties, cars and the need to evacuate homes.

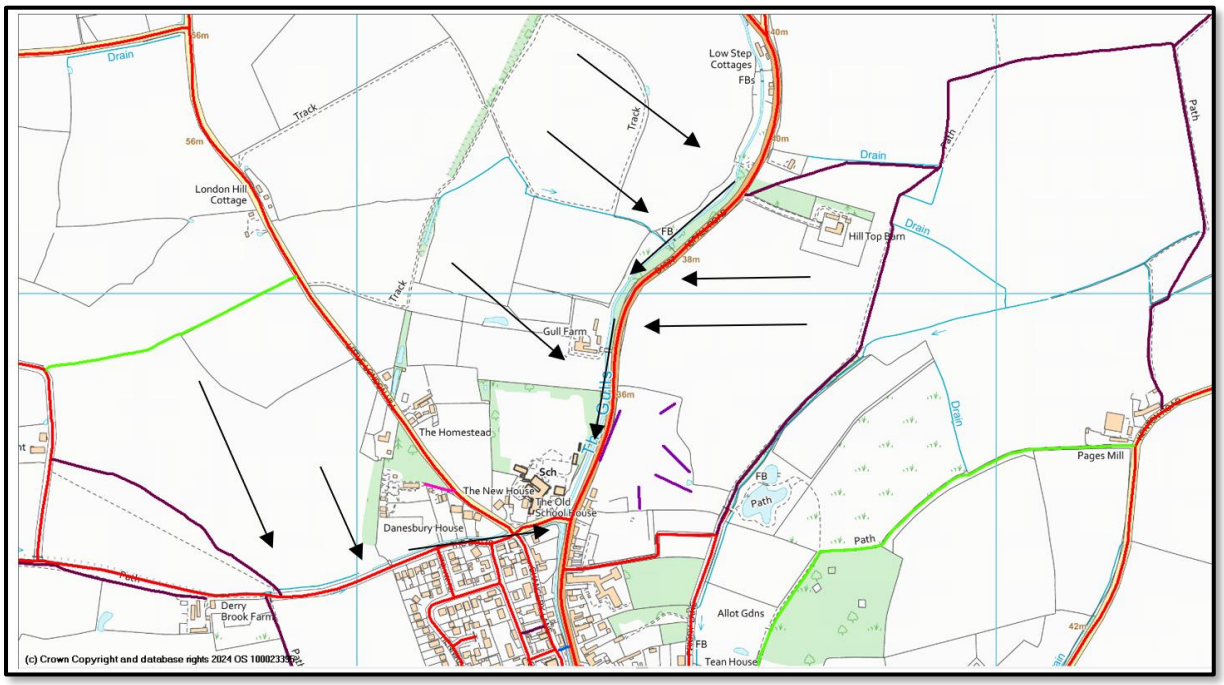

Figure 11 – Flow paths in northern Debenham

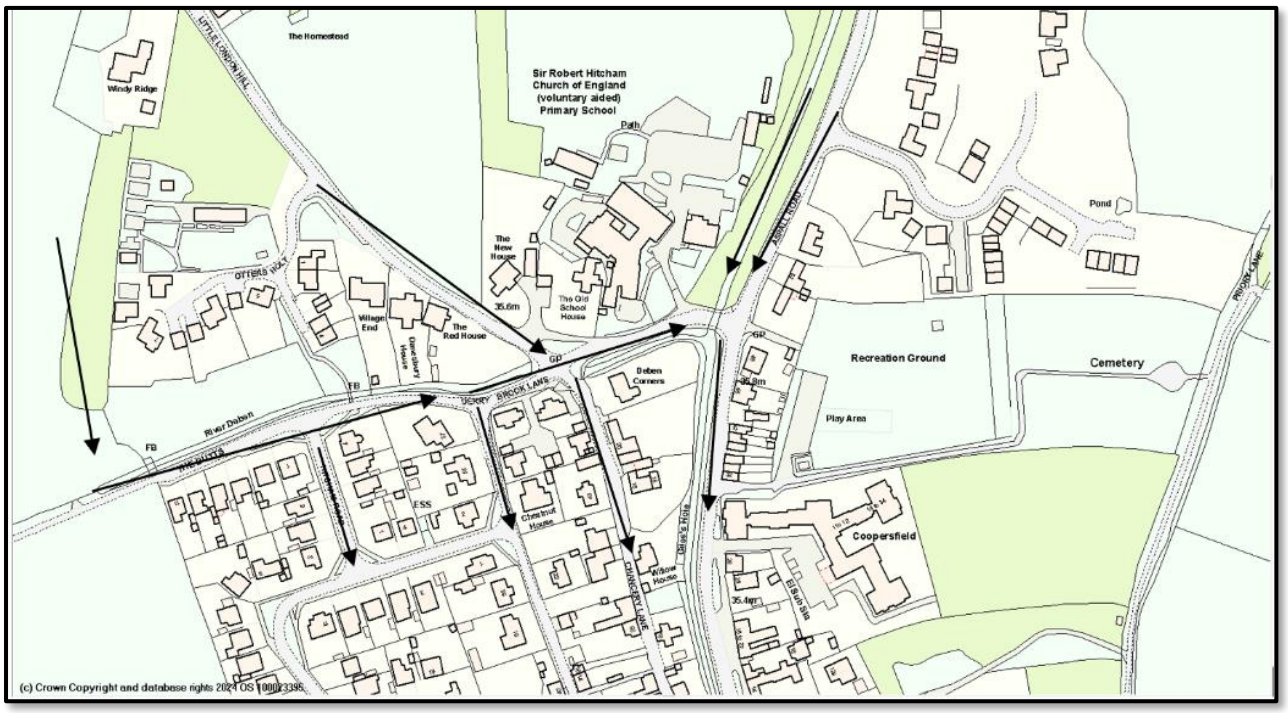

Figure 12 – Flow paths in northern Debenham

Summary:

- Large volume of water runoff from surrounding fields possibly caused damage to watercourses and allowed water to flow down the road.
- Concerns that the attenuation features on the new housing developments were not working correctly.

- Watercourses overtopping into the highway possibly exacerbated by high levels of vegetation in the area.
- Possible changes in cultivation direction could have funnelled water towards the highway and watercourses faster.

LLFA Recommended Action(s):

- Local Planning Authority to finalise the investigation into the local housing development to ensure the attenuation features are built to agreed plans and work effectively.
- Landowner to investigate possibility of cultivating fields across the hill rather than up and down which may help to slow up the surface water run-off.

c) Hitcham Road, The Butts, Great Back Lane & Derry Brook Lane

The northwest of Debenham, is made up roads that are located on, or very close to, the Derry Brook as it approaches the village from the western side.

Reports in the area suggest both run off from surrounding fields and nearby new housing developments, added to the river overtopping its banks and contributed to flooding in the area. The road acted as a secondary river pathway. Information suggests the watercourses were overwhelmed very quickly, reinforcing the already high-water levels from throughout October.

Concerns were raised that new housing developments, caused a higher intensity and speed of water run off due to significant amounts of non-permeable surface being added to the area (although at the time of the event all land will have been saturated and therefore impermeable). New developments are required to manage the surface water run off ensuring flood risk in the area is not increased. Recent housing developments in the area have been subject to planning conditions surrounding surface water management, and following consultation with the Local Planning Authority, possible issues have been raised with these sites with regards to surface water management, investigations are ongoing.

The flow path for the water in this area is from the west and north, heading east and south into the central village catchment. The overtopping of the Derry Brook in this area causing the road to act as a secondary flow path, contributing to the flooding experienced here and on the surrounding and adjoining streets such as Aspall Road and Chancery Lane.

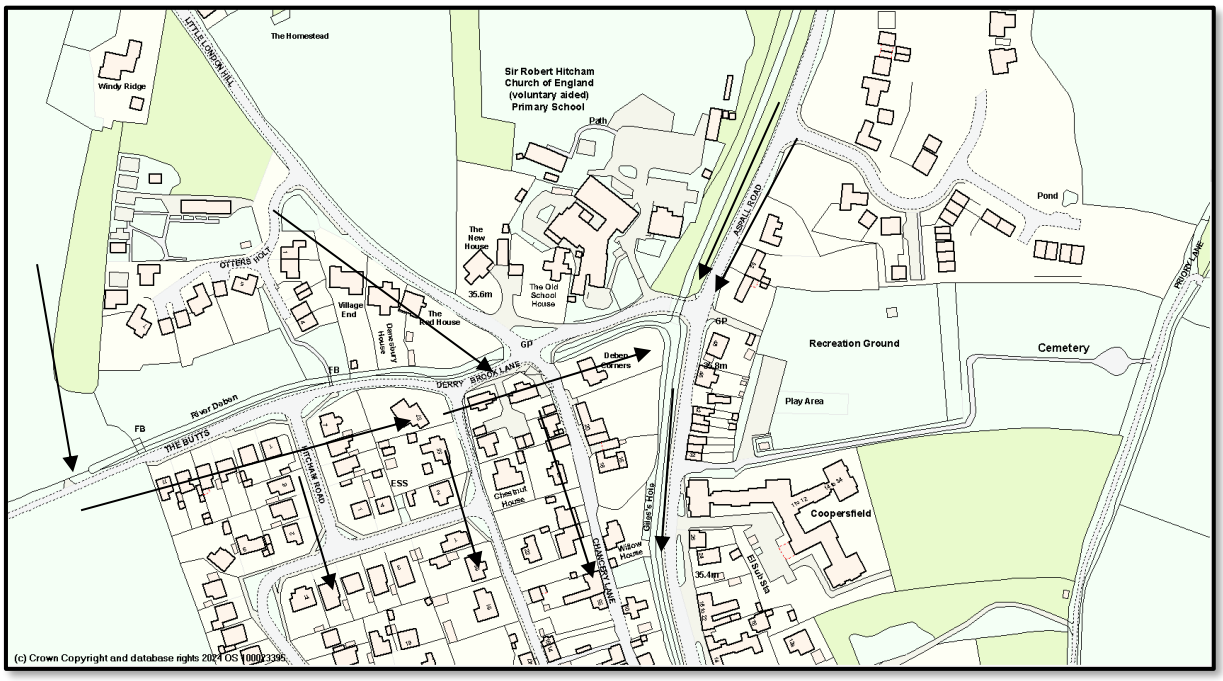

Figure 13 – Flow paths in northern Debenham

Reports have said that internal flooding was experienced by at least 5 properties across the four roads with internal depths of water reaching 35cm and external depths deep enough to fully submerge cars.

During Storm Ciaran (1st-2nd November 2023) the waters rose again, and concern was shown by some residents, however no records of internal flooding were reported.

Summary:

- Overwhelmed watercourses caused spill of flood water onto the highway which then entered properties from the highway.
- Concerns about recent housing developments and the management of surface water from the site.
- Saturated and low permeable ground could have exacerbated the flooding on this occasion.

LLFA Recommended Action(s):

- LPA to complete investigations into housing developments water management

d) Water Lane, Priory Lane, Cross Green & Meadow Works Business Park

Flooding appeared to start at around 10am at the northern part of Water Lane and reports from the event suggest water run-off from surrounding fields and the river overtopping its banks were both contributing to the flow. The flood water appeared to be contaminated with sewage and oil suggesting an overwhelmed foul sewerage system.

The water from the overtopped watercourse, ran down Priory Lane where residents reported that runoff from the allotments was also a contributing factor, supporting the predicted pluvial flood maps.

Residents in Water Lane showed concern surrounding the significant amount of development in the area, which they are concerned caused faster water movement, less infiltration and a higher quantity of water run off due to impermeable surfaces. See comments above regarding both new and existing developments.

The flow in this area comes primarily from the over topped River Deben, with water traveling south along Aspall Road and Chancery Lane, before flowing along Water Lane and down Priory Lane. Flow paths from northern Priory Lane and Kenton Road to the east, added to the flows, and resulted in the flooding of Cross Green and the Meadow Works business park.

There is some concern that the watercourse on the northern arm of Priory Lane and the culvert under the road on water lane were not operating to full capacity due to overgrowth and silting up of the features. This may have contributed to the severity of the flooding within this location. Currently the riparian ownership responsibilities of the section of watercourse in northern Priory Lane is under discussion. It should however be acknowledged that the volume of rainfall experienced, is likely to have exceeded the design capacity of drainage assets and led to the overwhelming of infrastructure in spite of vegetation levels.

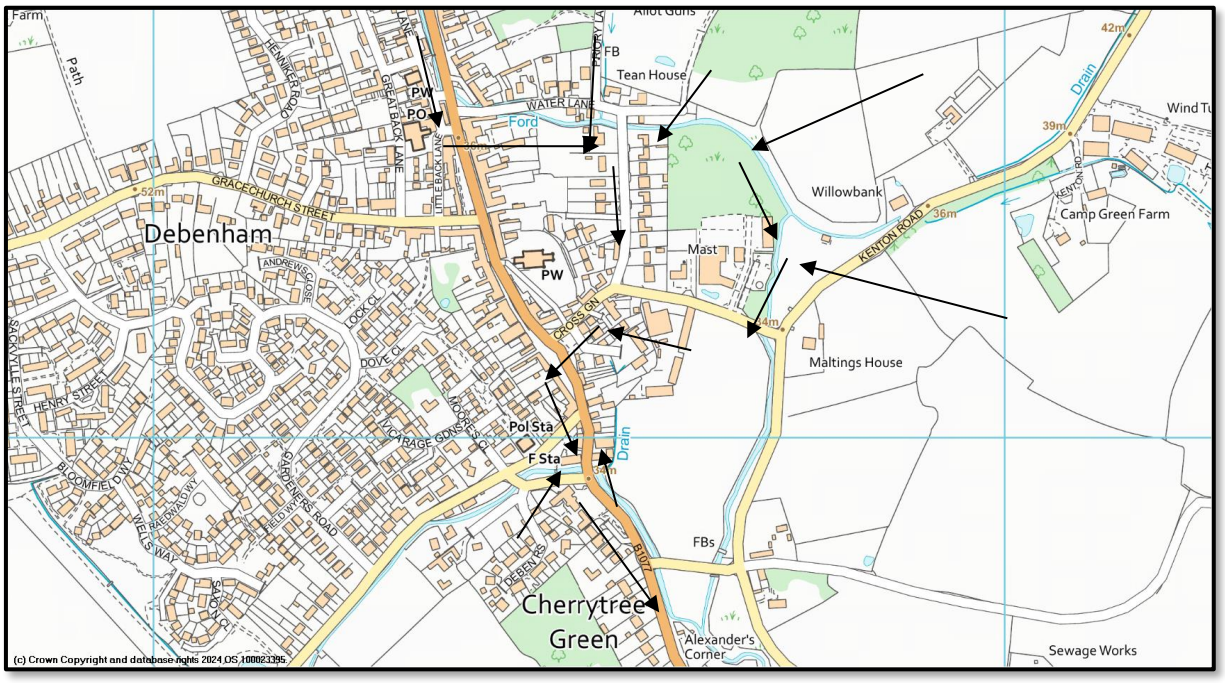

Figure 14 – Flow paths in central Debenham

There were 24 reports of affected properties in this area with internal flooding depths ranging from 20cm to over 90cm and external flood water being over 150cm deep.

There were many reports of vulnerable residents in this area being rescued from their homes in boats. Issues with emergency services being able to reach customers was reported as a major issue.

Summary:

- High rainfall resulted in excessive amounts of water flowing from a collection of sources through the town, contaminated with oil and sewerage.
- Priory Lane allotments appeared to have a significant level of run off.
- Concerns around increase in development in the area creating faster surface water runoff.
- Highway drainage system overwhelmed due to significant amount of water.
- Watercourses and culverts in the area may not have been working to full capacity.

LLFA Recommended Action(s):

- Investigate possible Natural Flood management feature on land just north of allotments which borders the northern part of Priory Lane.
- Increase regularity of maintenance of local watercourses to ensure a suitable flow is possible in heavy rainfall events (usually the responsibility of the riparian owner).
- SCC to confirm Riparian land owner responsibility for watercourse on northern part of Priory Lane.

e) High Street & River Close

High Street and River Close are central to the village and were badly affected by flooding from overwhelmed watercourses near Cherry Tree Lane, and Water Lane. Additionally, the amount of water appears to have overwhelmed the highway drainage and foul sewerage network, resulting in flooding to the highway which flowed into properties. This was exacerbated by vehicles continuing to drive through the water causing bow waves, which contributed to internal flooding due to breaching of doorsteps.

A large piece of land to the east of High Street is some of the lowest lying in the village (designated as Flood Zone 3) and acts as a flood plain. Many reports suggest that the water came from the back gardens and flooded properties on High Street, suggesting this flood plain was overwhelmed and resulted in internal flooding.

On the opposite side of the road, the Cherry Tree Brook tributary was overwhelmed, spilling water onto the road and breaching properties. It continued to flow towards High Street, converging with the water from the flood plain and breaching further properties.

Reports from the southern end of High Street suggest a lack of effective maintenance of the Cherry Tree Brook, which has the potential to slow the water flowing along the brook, into back gardens on Low Road, before flowing into properties.

As suggested in the catchment characteristics section of this report, this area of the village is one of the lowest points and any water which overwhelmed the watercourses, river or highways drainage network will find its way to this area, before flowing out of the village through the river Deben to the south. As such it is likely that a combination of sources contributed to the flooding.

Flow paths from the east and west merge in lower Debenham, travelling from the Cherry Tree Brook and the Water Lane/Green Cross/Priory Lane flow paths before flowing south out of the village.

Due to the significant amount of rainfall, once the Cherry Tree Brook and River Deben had been overwhelmed reports suggest that water was being forced north (against the natural flow) along an ordinary water course which borders the easterly edge of the back gardens of properties on the High Street, as a result of this the watercourse was very quickly overwhelmed and spilled out affecting properties from the back in addition to the water already coming from the highway to their front.

The land to the east of the High Street behind the properties is known to be one of the worst affected spots and is at very high risk of flooding from both fluvial and pluvial sources.

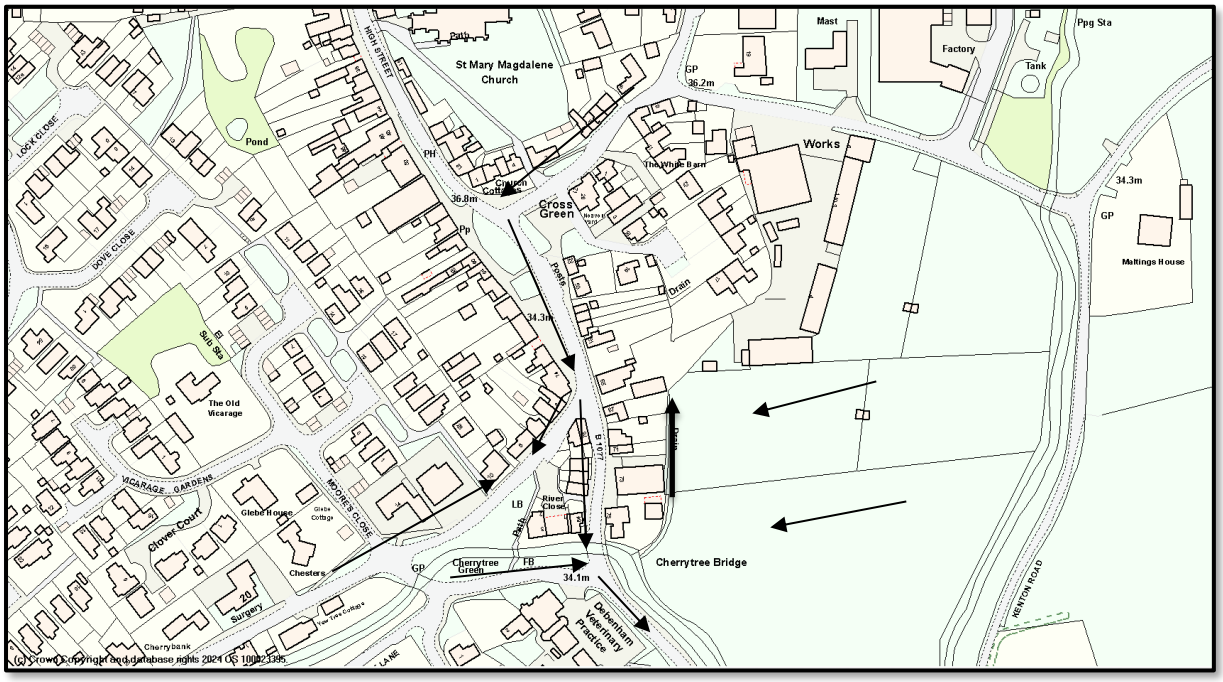

Figure 15 – Flow paths in central Debenham

24 Properties are known to have been affected in this area with reports ranging from 15cm to over 60cm of internal flooding.

Summary:

- Flood water from Cherry Tree Brook, Cross Green, and green space to the east of high street congregated in this area.
- Overland flows resulted in the cherry tree brook and River Deben to reach capacity.
- Continued vehicle movement through flood water caused worsening of flood water ingress to properties.
- Drainage assets on the highway were overwhelmed.

LLFA Recommended Action(s):

- SCC Highways authority to work with the community to adopt as part of an emergency plan possible warning signs to be placed in strategic locations in the Village to try and prevent people driving through flood water.
- Investigate possibility of water level flood warning system on the Cherry Tree Brook.

f) Kenton Road

Located to the east of the village centre, Kenton Road was an isolated case from the rest of the village. Reports suggest a combination of fast flowing surface water and overwhelmed watercourses in the area, contributed to the flooding, the water simply flowed to the lowest point once watercourses were overwhelmed.

Kenton Road is a main flow path on the predicted risk of surface water flooding maps. There are several ordinary watercourses in the area which flow adjacent to the road on both sides. Additionally, there are a number of watercourses that are piped, which may have caused a constriction if blocked or have insufficient capacity during Storm Babet. This may have resulted in the overwhelming of watercourses and contributed to flooding experienced in this location.

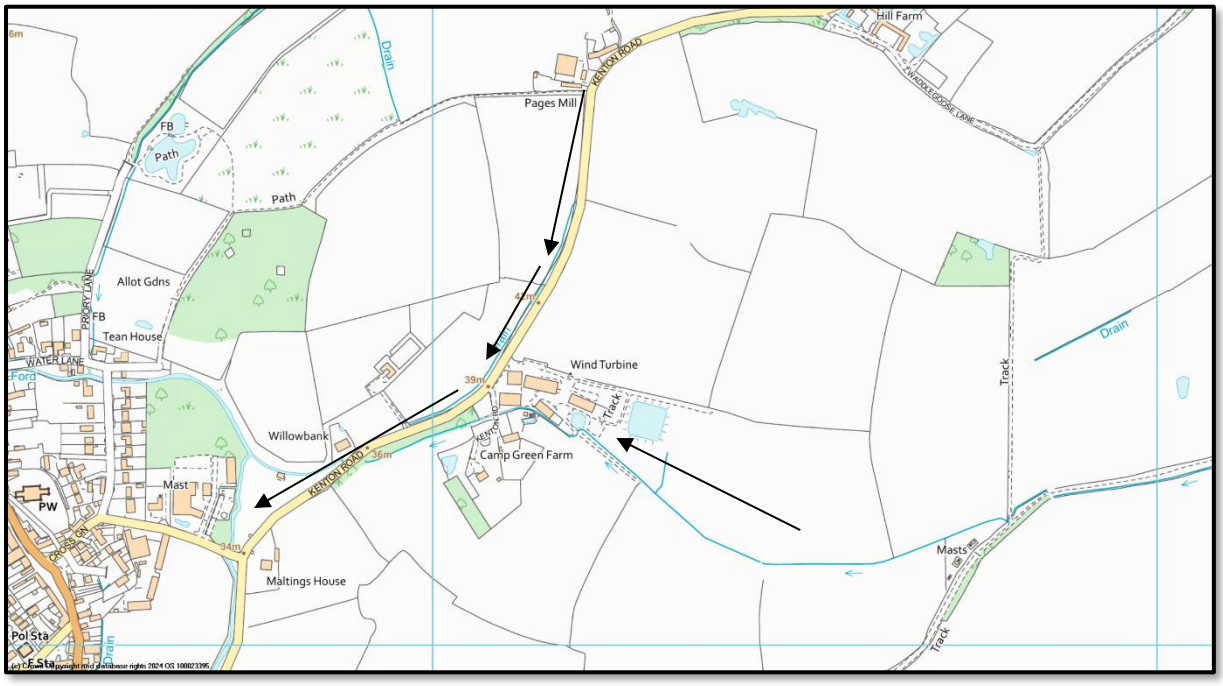

Figure 16 – Flow paths in eastern Debenham

Flooding was recorded as being approximately 45cm deep affecting offices, farm buildings and workshops.

Summary:

- An area at high risk to surface water flooding
- Overwhelmed watercourses spilled onto the highway
- Possible block or constriction of watercourses in the area.

LLFA Recommended Action(s):

- The fields in this area may be a suitable location for Natural Flood management to try and control the flow of water which could help in the central catchment also by reducing the speed of the flow from this flow path.

g) Low Road & Cherry Tree Lane

Reports from this area suggest that the Cherry Tree Brook was one of the first watercourses to be overwhelmed. All drainage infrastructure in the area reached capacity very quickly, with outfall pipes which discharge into the Cherry Tree Brook submerged by the rising river water levels. This severely restricted the ability of water to drain away and resulted in flood water backing into gardens and eventually properties in this area. This supports what was witnessed in nearby streets.

Many properties in the area reported being affected from both the road at the front of the property and the Brook at the back of the property. Properties were surrounded by flood water and in some cases flood water was coming up through the floor due to rising groundwater levels.

The flow path experienced is in line with the predicted flood risk map, coming along the line of the Cherry Tree Brook and spilling on Low Road and Cherry Tree Lane. As the water passes along Low Road, it meets the High Street, accumulating here before flowing south out of the catchment.

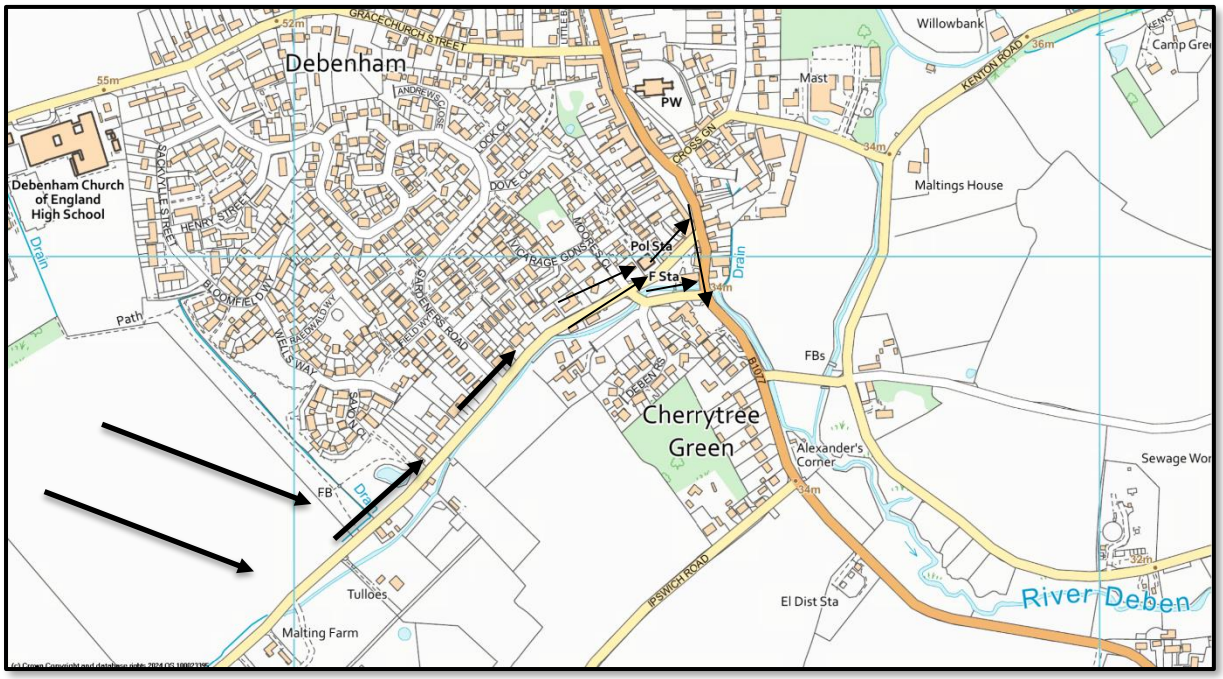

Figure 17 – Flow paths in southern Debenham

Commercial and residential properties in this area were affected, with significant damage being done to resources in local emergency services stations and charitable centres. 23 properties are known to have been affected with reports suggesting internal flooding levels of between 15cm and 90cm being recorded and external depths of over 90cm being observed.

Summary:

- Quickly overwhelmed watercourses resulted in the highway acting as secondary flow path.
- Highways drainage and sewerage systems reaching capacity and blinded outfalls to the river restricting drainage.

LLFA Recommended Action(s):

- Look into early warning flood trigger to be placed on the Cherry Tree Brook.

h) Gracechurch Street & Henry Street

Located to the West of Debenham, there is a very small area of Henry Street which shows as a possible flood risk, that appears to be the area affected by the flooding. Reports from the area suggest that the highways drainage network and sewage system were overwhelmed.

It is therefore likely that volume of water and potential blockages within highways networks were contributing factors.

Gracechurch Street shows as and area of very low risk to surface water flooding on the predicted flood maps. However, reports in the area suggest that a blocked sewer or highways drainage gully could have been a contributing factor. Given only a small number of properties were affected, a localised blockage could have contributed to the flooding.

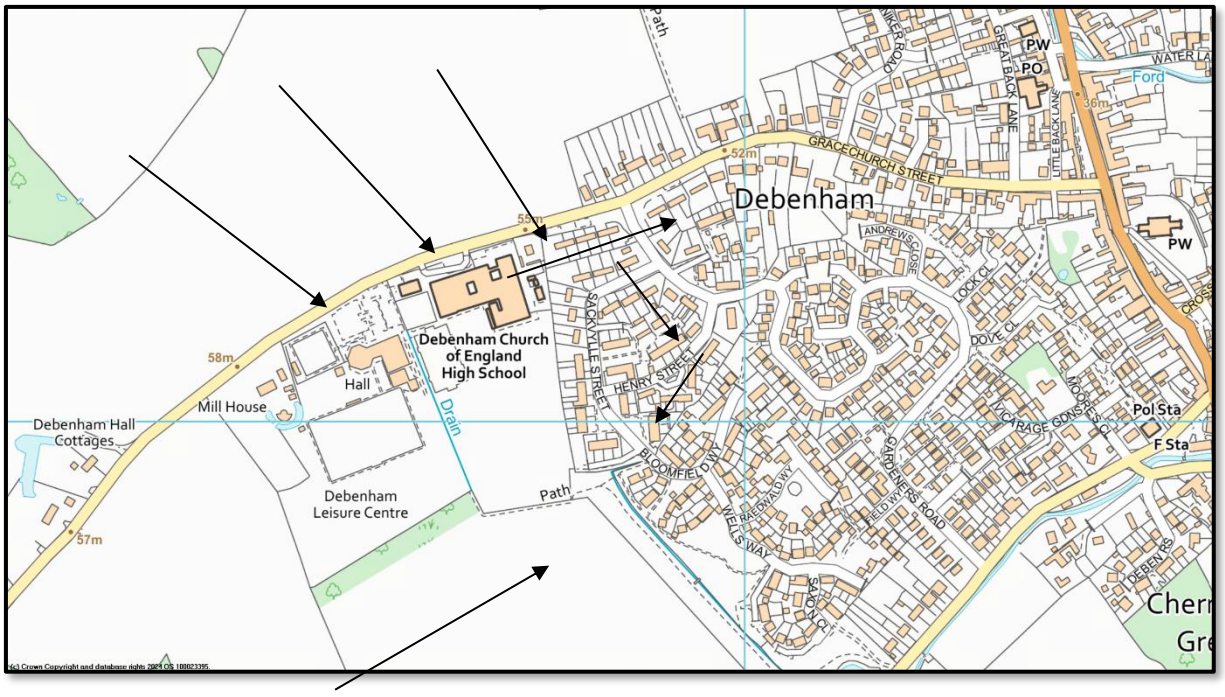

Figure 18 – Flow paths in western Debenham

Summary:

- Significant rainfall overwhelming drainage networks
- Possible localised blockage of highway drainage in the area

LLFA Recommended Action(s):

- Highways authority or Anglian Water to investigate the possibility of a localised blockage and clear if present.

i) Fen Street

Fen Street is a Hamlet along Winston Road (B1077), half a kilometre southeast of Debenham village. A small number of properties were reported to have flooded during Storm Babet and are situated parallel to the River Deben. There is limited information for this area but of what has been received, it was reported that the River Deben overtopped its banks onto the flood plain before flooding properties from the rear. Flood water also travelled from the road descending north towards the properties resulting in properties being surrounded by flood water. Impacted properties are situated lower than the road.

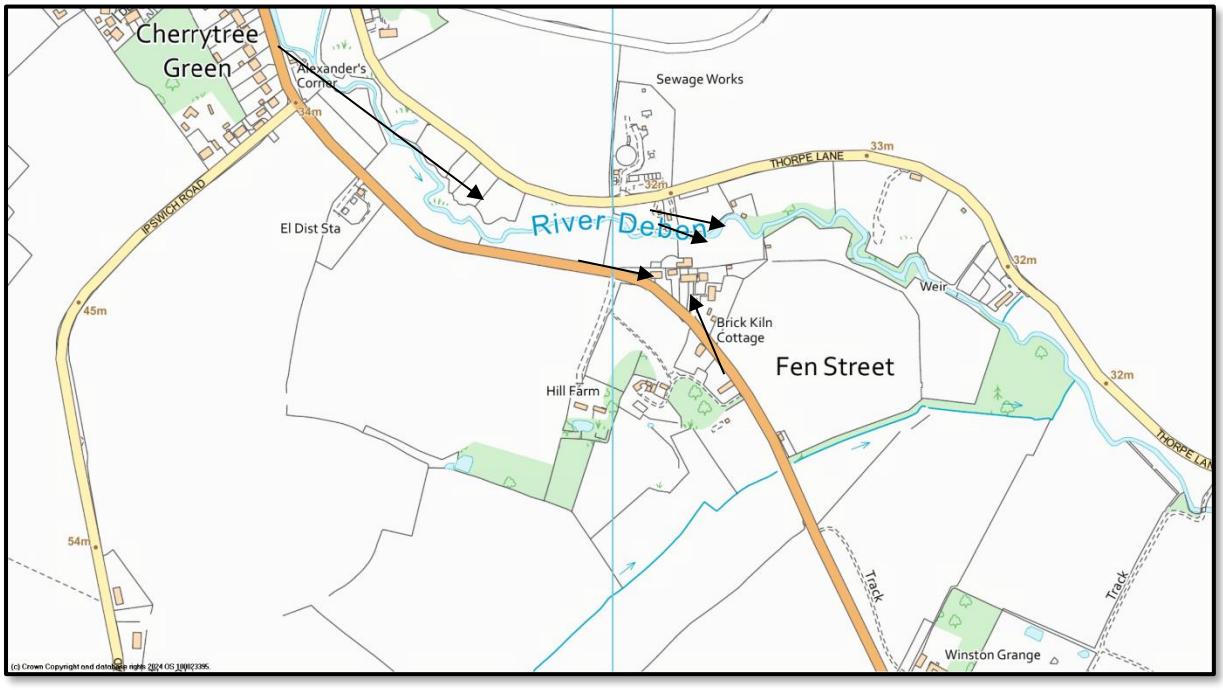

Figure 19 – Flow paths in southern Debenham

Summary:

- Surface water flows exceeding the capacity of drainage infrastructure and travelled north towards the River Deben.
- River Deben exceeded capacity and overtopped into floodplain.

LLFA Recommended Action(s):

- No action suggested beyond those made to all affected residents in the recommendations section of this report.

Photos of Flooding

Looking South towards Debenham from Aspall Lane

Central Debenham, residents having to be rescued by boat

Debenham Fire station

Post event wrack marks measured by EA CIOs

High Street Debenham

The Butts, Debenham

Internal Flooding extents

External flooding extents

High Street, Debenham

High Street, Debenham

Risk Management Authorities, Non Risk Management Authority and flood risk function(s)

The following section acknowledges both RMA's and Non-RMA's relevant to Debenham and provide an overview of their flood risk functions. The table has been compiled from information collated as part of the investigation. It is not exhaustive and it should be acknowledged additional organisations and groups may be active within the community.

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 river
Anglian Water	Asset Owner
Babergh & Mid Suffolk District Council	Local Planning Authority & Asset Owner
Non-Risk Management Authority	**Relevant Flood Risk Function(s)**
Private Landowners	Riparian Responsibilities of watercourses and land management
Private Homeowners	Improving flood resilience to property and some riparian responsibilities if adjacent to watercourses.
Parish Council	Manage flood risk at a community level, prepare and produce flood action plans and maintain watercourses where present on land they own.
Volunteer/Community Groups	Provides benefits to the local community, environment or to aid a specific case

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
A recorded gully cleanse occurred in December 2023 and unrecorded visit occurred shortly after the storm, due to resource	Suffolk County Council (SCC) Highways Authority.	Complete

availability. This event was not recorded on internal systems.		
An overhaul of the inspection and cleansing routine has been completed to ensure all gullies across Suffolk are included and higher priority is given to areas where flooding is known to be an issue with annually, or biennial inspections and cleanses planned based on risk.	Suffolk County Council (SCC) Highways Authority.	Complete – next visit to Debenham is planned for July 2024.
Review of early warning flood system for water level on river Deben and main river tributaries	EA (Environment Agency)	Analysis of Debenham gauged water level data, including the high flows data from this wet Autumn/Winter 23/24 has been undertaken in the context of information on the impacts experienced in the community. We have refined our flood warning and flood alert trigger threshold levels. The new thresholds are now active and will ensure that flood alerts warnings for Debenham are now more accurate and timelier. River Levels on the Internet data has been updated to reflect these recent changes and are available for public viewing on check for flooding.
Raise awareness and participation in existing PFR grant funding schemes	Residents/ businesses/ Environment Agency/ Suffolk County Council	Ongoing
Channel maintenance/ blockage removal.	Environment Agency/ Riparian landowners	Completed/ongoing
Litter picking with emphasis on the river/ water courses	Debenham parish council/ landowners/ volunteer groups	Completed
Encouraging active reporting of blockages in water courses/ drains.	Debenham parish council/ landowners/ volunteer groups	Completed/ongoing
EA modelling exercise – ongoing to look at impact/	Debenham parish council/ landowners/ Volunteer Group/EA	Ongoing

benefit of clearing pinch points in the river.		
Debenham volunteer group organised an engagement session with agencies and landowners.	Debenham parish council/ landowners/ Volunteer Groups	Completed
Engagement with those in the community directly affected by flooding to understand their experiences and the immediate considerations for reviewing the Emergency Plan	Debenham parish council/ landowners/ Volunteer Groups	Completed
Removal of obvious blockages – trees/ branches/ flood debris by the various agencies/ members of the community.	Debenham parish council/ landowners/ Volunteer Groups	Completed

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 Debenham. They have been derived from evidence collected during the investigation and included having been considered relevant and realistic to implement. The implementation of actions falls to the relevant responsible party. Progress on the action will be monitored by Suffolk County Council and updates published, but it should be acknowledged that the Council does not have 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 or revise a Community Emergency Plan that includes reference to flood events – Liaison with Suffolk Resilience Forum	Debenham Parish Council	6-12 months	
Check proposed water management strategies put in place as part of recent building developments on Little London Hill and Aspall Road are working effectively and not increasing flood risk in the area.	Local Planning Authority	6-12 months	
Maximise the take up of the £5k PFR Grant currently available to residents before the April 2025 deadline	SCC LLFA (Lead Local Flood Authority) / Residents	Latest April 2025	
Remove observed blockages within ordinary watercourses and main river	EA (where increase to flood risk is observed) / Riparian Owners	As and when required	Ongoing
Increase the maintenance of watercourse management across the town and report observed blockages to riparian owners or relevant RMA	Riparian Owners / Community	As and when required	Ongoing

AWS investigate possible blockage in network located on Gracechurch Street	AWS	6 Months	
Investigate possible blockage of culvert located on Bellwell Lane	SCC Highways Authority	6 Months	
Investigate possible blockage in highways network system located on Gracechurch Street	SCC Highways Authority	6 Months	
Complete the already proposed future planned works in Gracechurch Street, Cherry Tree Lane and Low Road.	SCC Highways Authority	6-12 months	
Alterations to existing land management regimes to manage the flow of water from higher land	Landowners	6-12 months	
Community Self Help scheme to enable small scale clearance of drainage assets and deployment of flood warning signs	Parish Council / SCC Highways Authority	6-12 months	
Installation of Property Flood Resilience (PFR) measures.	Environment Agency	6 months	Progress with the installation of PFR measures to the 10 properties that were previously identified as being at greatest flood risk and opted to be involved.
Medium Term Actions (e.g. longer planning timescales and potential need to source funding but potential for greater impact)			
Investigate the implementation of individual rainwater storage features i.e. water butts, to manage surface water contributions into drainage network.	Private Residents	12-24 months	
Investigate potential NFM projects and funding	EA/SCC LLFA/Landowners	12-24 months	

opportunities which aim to attenuate water and 'slow the flow' in the upper catchments e.g. reservoirs, storage ponds, wetland areas, leaky dams.	Key identified areas for possible schemes are: • Field north of Allotments adjacent to Priory Lane. • Fields north west of the village near the approach to 'The Butts'. • Fields to the east of the village adjacent to Kenton Road. • Fields north of the village near the culvert on Bellwell Lane.		
Investigate the flood risk implications of varying amounts of silt in the Main River channel.	Environment Agency	TBC	We have engaged consultants to carry out hydraulic modelling. This will help us better understand the impact that silt / soil in the channel has on flood risk in the village, and whether the Environment Agency's maintenance regime could be improved.
Installation of Property Flood Resilience (PFR) measures via grant funded schemes.	Residents/businesses/Environment Agency/SCC LLFA	TBC	Properties that flooded internally during Storm Babet will be contacted in July 2024 and invited to be involved in a project to investigate installing PFR measures.
Improved understanding and modelling of fluvial and pluvial flooding within the town to inform bids for potential capital works.	SCC LLFA / EA	TBC	

Investigate potential new/additional highway drainage assets to manage surface water flows	/ SCC Highways Authority	TBC	
Long Term actions (significantly longer timescale and budget required with potentially greater positive impact)			
Installation of NFM features within upper catchments to attenuate and slow flood water if investigation works suggest it is viable.	SCC LLFA/EA/landowners	TBC	
Investigation of potential improvements to the Flood warning Service for Debenham	EA	TBC	Plans to investigate whether flood warning information could be improved, particularly focusing on identifying recommendations for improved information regarding contributing flows from the three main tributaries upstream of Debenham.
Improvements to existing sewage infrastructure and the implementation of flood resilience measures i.e. non-return valves and/or isolation of network to prevent water ingress if investigation works suggest it is viable.	AWS	TBC	
Improvements to highway drainage network to manage surface water flows if investigation works suggest it is viable.	SCC Highways Authority	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.