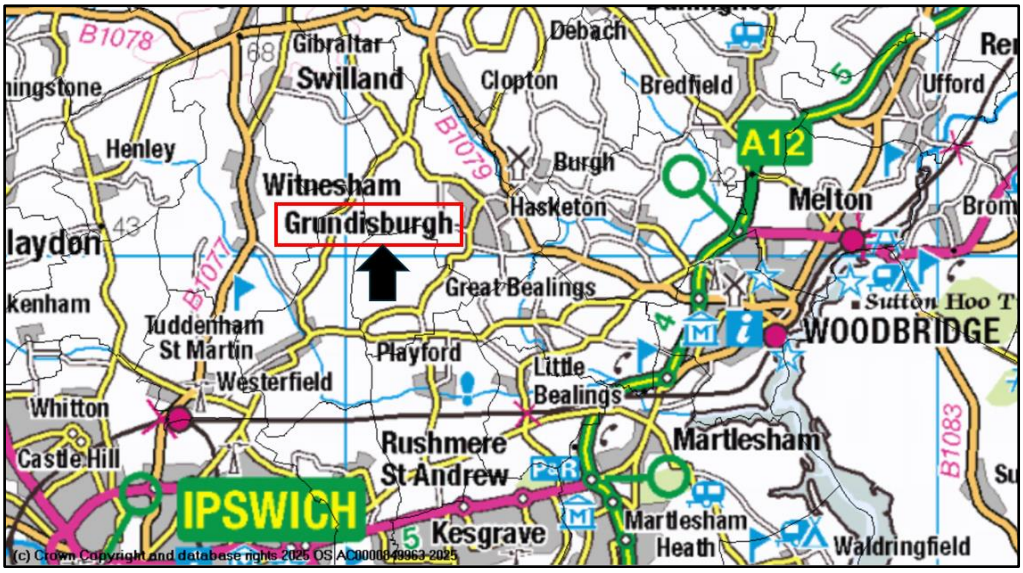
Section 19 Flood and Water Management Act 2010

Grundisburgh 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. The community of Grundisburgh was significantly impacted, with approximately seven 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.

Grundisburgh is located in an area at significant risk of both fluvial and pluvial flooding and the nature of the surrounding topography and geology contributes to the susceptibility of the community to flooding. Areas of Grundisburgh are low-lying and located within the historic floodplain. The local geology and soils are susceptible to high run off, also making some properties in the village vulnerable to flooding due to intense rainfall events.

Storm Babet delivered significant rainfall to the catchment, following an extended period of above average rainfall. Impacts within Grundisburgh were widespread and for the purposes of this report, the affected areas have been categorised into two 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. 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 Grundisburgh 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 Grundisburgh. For short term measures, key highlights include the implementation of a community flood plan and maximising Property Flood Resilience (PFR) measures. For medium to longer term recommendations, there is an emphasis on the management of water from rural land though 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 Meteorological 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 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 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.

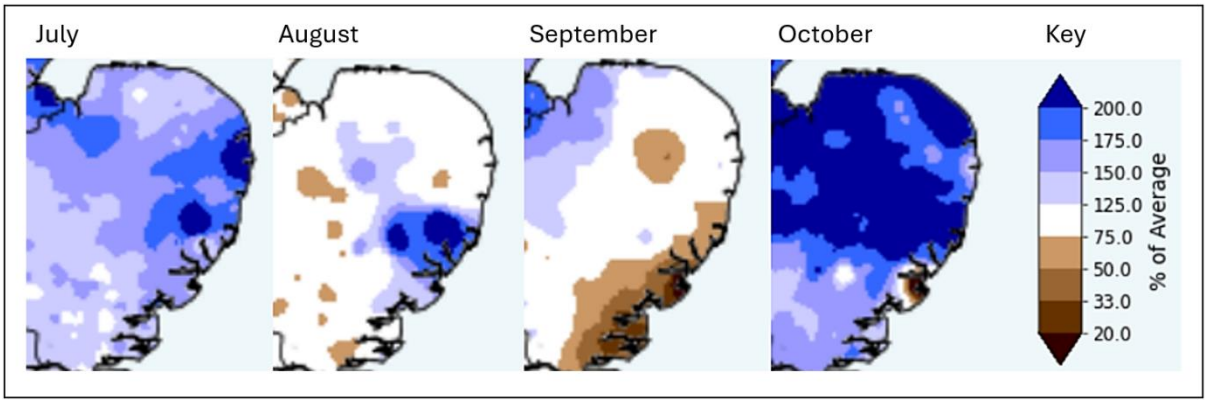


Fig. 1. Average monthly rainfall (July – October 2023) as a percentage of the historic average monthly rainfall

The following report acknowledges that October 2023 and particularly 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 village of Grundisburgh is located in the district of East Suffolk District Council, approximately 5½ miles northeast of Ipswich and 3 miles northwest of Woodbridge. Fig. 2 shows the approximate area where internal flooding of property occurred.

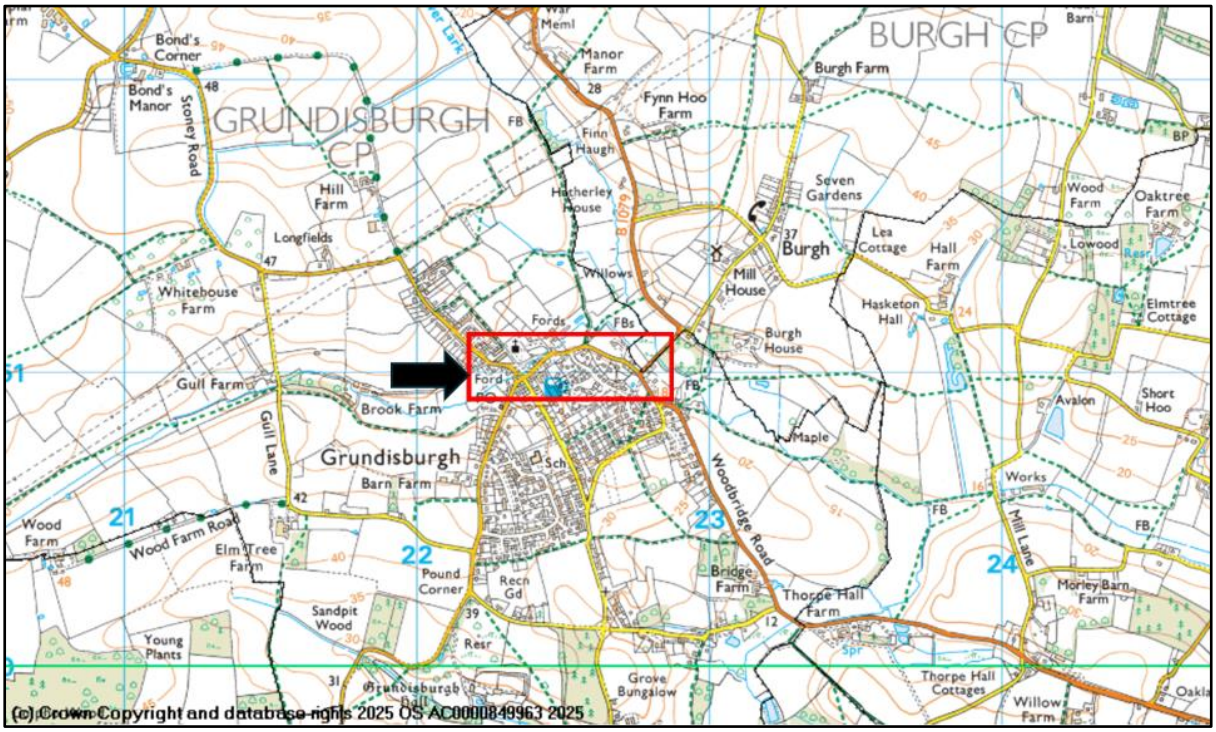


Fig. 2. Investigation area map

Fig. 3 shows the most significant watercourses in and around Grundisburgh. The River Lark (a statutory main river) flows southwards down the east side of Grundisburgh. It is joined by a tributary flowing eastwards across the north side of Grundisburgh.

Fig. 3. Location of statutory main rivers (Environment Agency)

The Environment Agency has permissive powers to carry out maintenance, improvement or construction work on statutory main rivers to manage flood risk. 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.

The East Suffolk Water Management Board (ESWMB) manages flood risk for the ordinary watercourses flowing into the River Lark in the area shown in Fig.4.

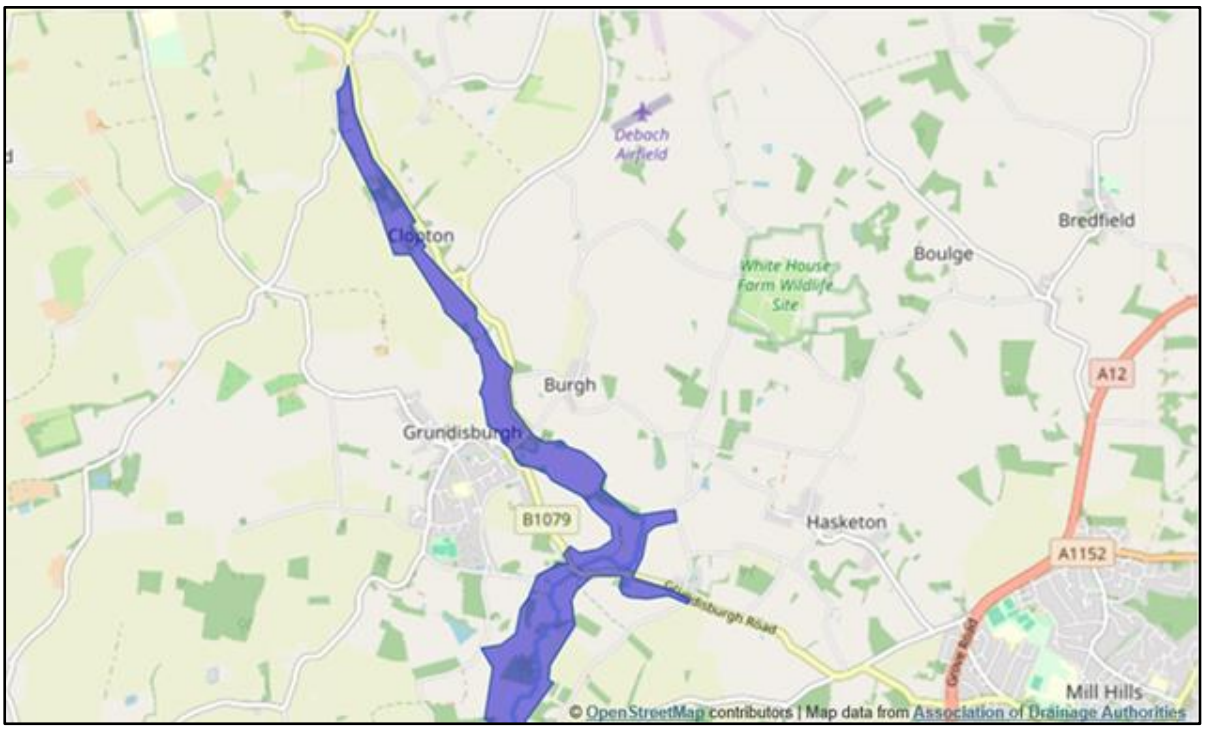


Fig. 4 Area of East Suffolk Water Management Board responsibility for flood risk in ordinary watercourses

On the 20th October 2023, Storm Babet resulted in significant rainfall across Suffolk on already saturated ground due to above average rainfall in the preceding weeks. Grundisburgh was significantly impacted with approximately seven properties reporting internal flooding. Flood water was described as coming from several sources including surface water runoff from surrounding fields and land (pluvial), 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 various areas affected by flooding have been separated into two distinct zones:

1. The Green
2. Grundisburgh Road and Woodbridge Road

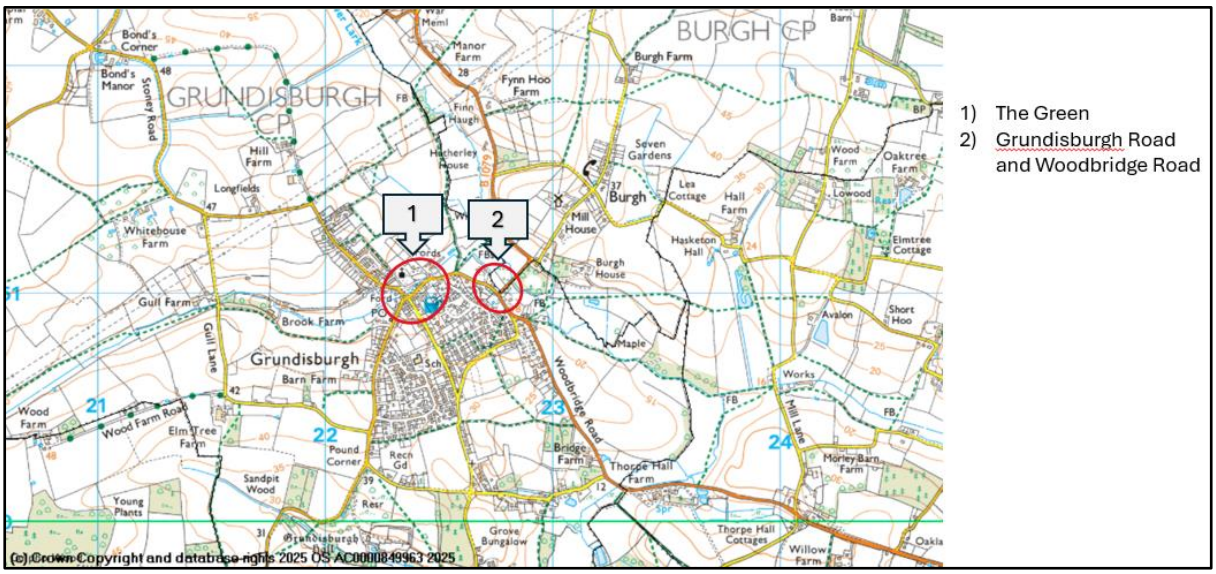


Fig. 5. Distinct flood zones for investigation

3. Records of any historical flooding

A review of Suffolk County Council's Highways reporting tool, local and social media reports included one report of internal flooding of one property in the vicinity of The Green in 1953.

The Environment Agency holds one record of BBC travel news of B1079 being affected by flooding due to heavy rain leading to fluvial/surface water flooding impacts.

Anglian Water received one additional report of internal flooding in Orchard End during Storm Babet which was attributed to significant rainfall causing hydraulic overload.

SCC Highways have no reports of internal property flooding prior to Storm Babet but have two reports of internal flooding during winter 2023 – 2024.

4. Predicted Flood Risk

The parish of Grundisburgh is at significant risk of pluvial (surface water) flooding (Fig. 6). All affected property is projected to be at high surface water flood risk except for two properties on the B1079 in the vicinity of the junction with Woodbridge Road (Zone 2). One of these is projected to be at medium surface water flood risk and the other is projected to be at no surface water flood risk.

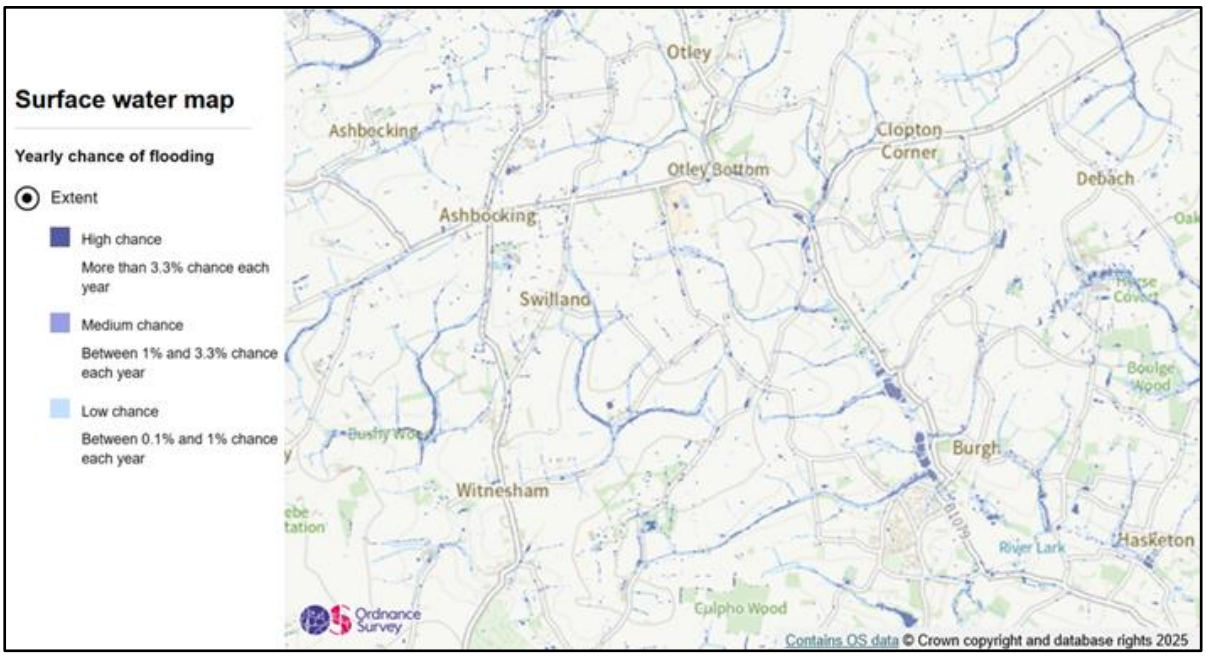


Fig. 6. Predicted pluvial flood risk (surface water) (Environment Agency)

Two affected properties in Zone 2 are at low fluvial flood risk. No affected properties in Zone 1 are at fluvial flood risk. It should be noted that low chance of flooding indicates a flood risk during more extreme events, such as Storm Babet.

Fig. 7. Predicted fluvial flood risk (from rivers) (Environment Agency)

5. Catchment characteristics

The parish of Grundisburgh encompasses part of the River Lark catchment, including a tributary which flows from the west of Grundisburgh and joins the River Lark to the east of Grundisburgh.

The parish is situated in a rural area with farmland used predominantly for arable agriculture, with some grassland and pasture. Significant areas of the parish are relatively flat and low lying, meaning that surface water accumulates in these areas and is not rapidly dispersed. Overwhelmed infrastructure and watercourses may be observed during intense rainfall events.

Fig. 8. Elevation (National River Flow Archive)

The soils in the area of the River Lark catchment upstream of Grundisburgh are loamy and clayey with impeded drainage or are only slowly permeable and seasonally wet. This means that surface water runoff is greater, particularly during intense rainfall (Fig. 9). However, the saturated nature of the soils leading up to the event would also have prevented some infiltration.

Fig. 9. Soil map of catchment area (LandIS Soilscapes)

Fig. 10 shows that much of the superficial geology in the River Lark catchment upstream of Grundisburgh 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 generally has a low permeability meaning water will tend to flow off it before it can infiltrate, which also reflects the reports collected during Storm Babet.

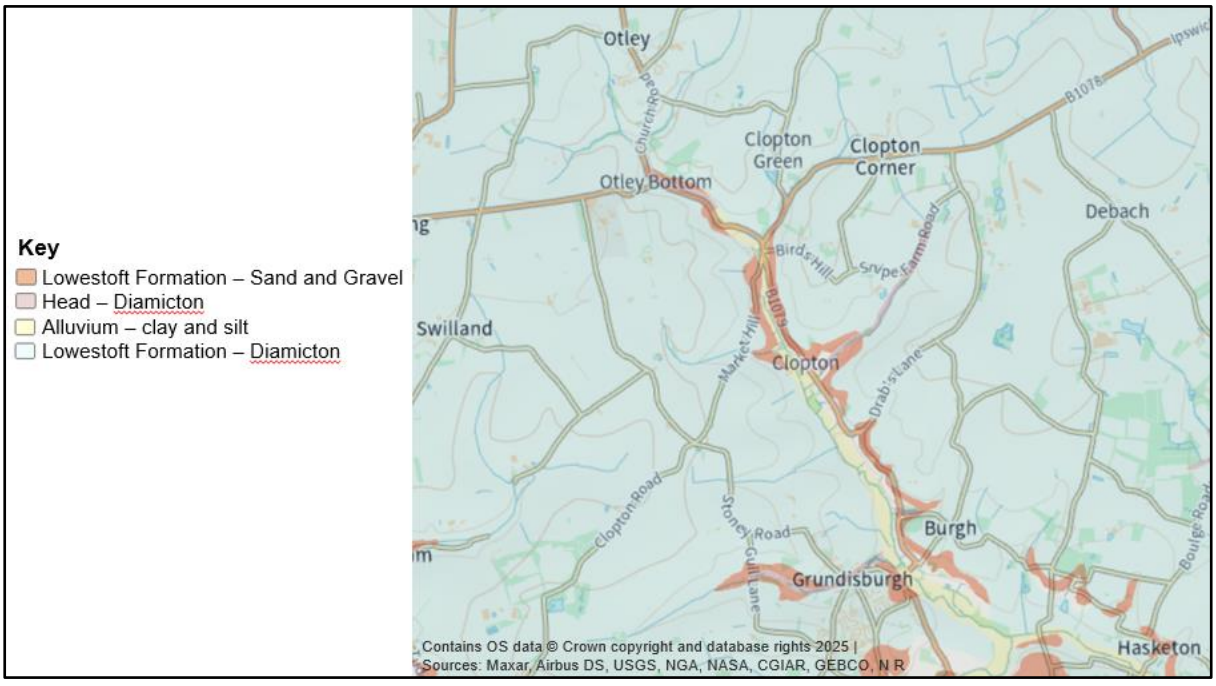


Fig. 10. Superficial geology of catchment area (British Geological Society)

The bedrock in Grundisburgh and the surrounding area consists predominantly of Newhaven Chalk Formation – Chalk and Red Crag Formation - sand which are generally relatively permeable (Fig. 10). However, during short term intense rainfall events, soil composition and superficial geology become more influential in affecting the volume of surface water runoff. Combined with the presence of significant low lying relatively flat areas, this makes Grundisburgh susceptible to extreme rainfall events. Saturated ground and high rainfall, like that of Storm Babet, will further emphasise the vulnerability of the parish and localised flooding could be experienced.

Flooding Sources, Pathways & Receptors

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

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 'floodwater' may be used to describe both fluvial (water from a watercourse), pluvial (surface water run-off) and groundwater flooding. This section has been prepared using reports submitted to Suffolk County Council via the online Highways Reporting Tool, community information and site visits.

Data from surrounding Environment Agency rain gauges indicates that a significant volume of rain was experienced during Storm Babet. The nearest rainfall gauge to Grundisburgh is at Woodbridge, where 51.4mm of rainfall was recorded on 20th October 2023, with 40.2mm recorded between 5.45am and 14.45.

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.

Areas of Grundisburgh around The Green and Woodbridge Road lie within the Flood Alert area for The Rivers Deben and Lark. This Flood Alert was issued on 18th October 2023 at 22:12pm and remained in force until it was removed on 24th October 2023.

The Flood Warning Area covers a similar extent of Grundisburgh as the associate Flood Alert Area. A Flood Warning for The River Lark from Clopton to Martlesham was issued on 20th October 2023 at 10:14am, remaining in force until it was removed on 24th October 2023.

It should be noted that the extents of each of our Flood Alert and Flood Warning Areas have been recently amended to reflect data obtained following Storm Babet.

Detailed descriptions of each investigation area can be found below.

1. The Green

The western area of Grundisburgh where property was affected by internal flooding was in the area surrounding The Green (Flow paths are shown in Fig.11). Five properties were affected in this location. The projected flood risk within this location for affected property is high risk from pluvial flooding and no risk for fluvial flooding.

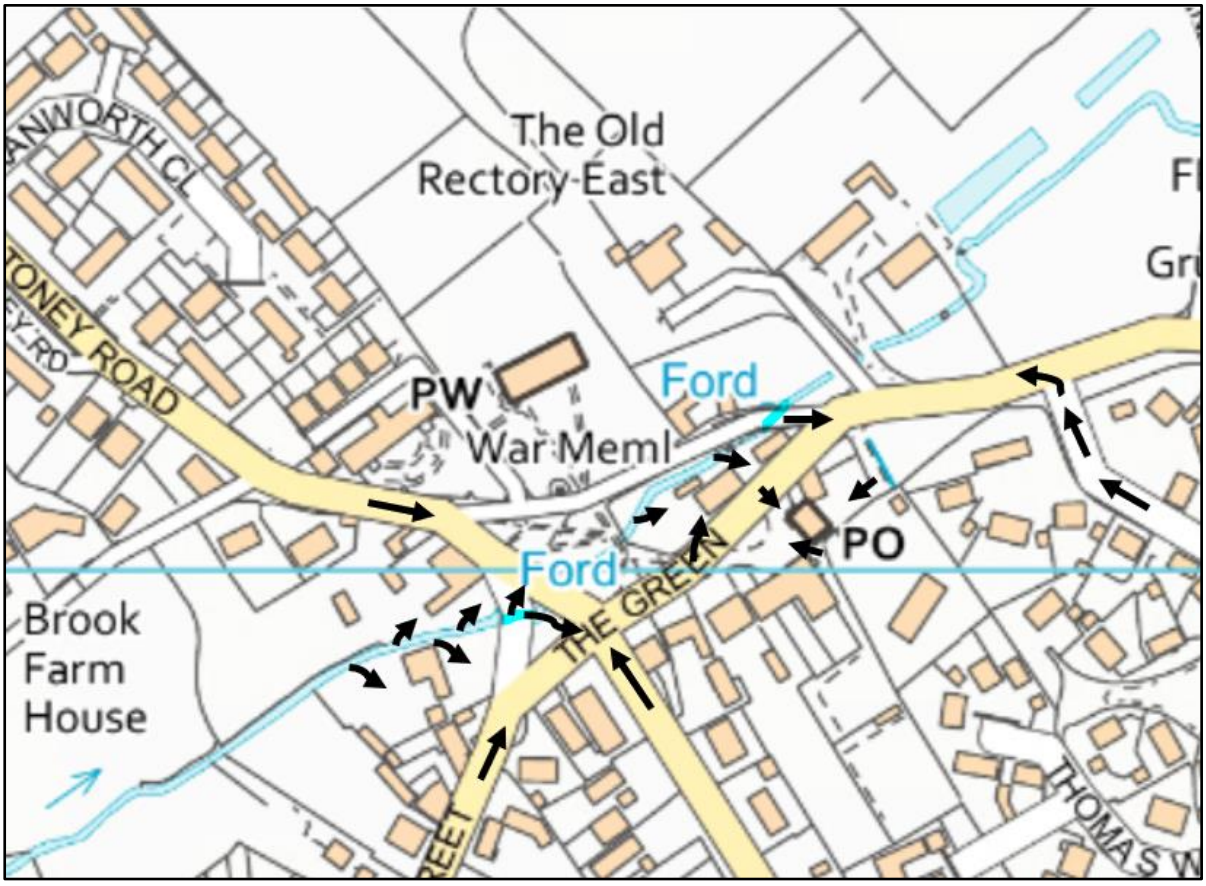


Fig. 111 Approximate flood water flow paths at The Green

During Storm Babet, the tributary flowing through the village green was reported to have overtopped, flooding surrounding properties to an internal depth which reached a maximum of approximately 30cm. The tributary was reported as rising fairly quickly during the morning of 20th October, with floodwater covering the village green and the junction between Meeting Lane and The Green by lunchtime. The level of the tributary at the ford on Stoney Road near the eastern end of The Green was reported to have reached approximately 1.2m. Wash from vehicles travelling on The Green also contributed further to flooding.

Property on the west side of the village green and the north and south side of The Green (highway) was internally flooded. Floodwater entered property on the west side of the village green at approximately 10am. and rose to approximately 15cm within affected property in 15 minutes, eventually reaching approximately 40cm. Internal floodwater began to subside at approximately 16.00 and most of it had disappeared by 18.00. Floodwater entered property at the east end of The Green, on the south side, predominantly from the east. Surface water also flowed from higher ground to the south of affected property here combining with floodwater from the overtopped tributary. It entered property at this east end of The Green with sufficient force to displace household furniture including an oven and washing machine. Internal floodwater levels reached approximately 24cm.

Five out of fifteen of the gullies in the vicinity of The Green may not have been fully functioning during Storm Babet as they were reported not to be operational during subsequent routine maintenance visits. These merit further investigation, although due to the extreme rainfall conditions in Storm Babet, the capacity of the wider drainage system, even if fully functioning, would have been limited.

In summary:

- The tributary to the River Lark overtopped its banks, contributing to floodwater in the vicinity of The Green.
- Wash from vehicles on the highways exacerbated flooding.
- Surface water flowed from higher ground in the south, contributing to floodwater at the eastern end of The Green.
- Some of the gullies surrounding The Green may not have been fully functioning during Storm Babet.

Recommended actions:

- Residents to install Property Flood Resilience (PFR) measures.
- Suffolk Highways to investigate the functioning of gullies surrounding The Green.
- Explore potential natural flood management measures (eg. leaky dams, attenuation ponds and flood plain reconnection) to “slow the flow” and attenuate water west of The Green in the upper catchment of the tributary and on surface water flow paths.

2. Grundisburgh Road and Woodbridge Road

Two properties were affected in this location. Affected property is at low fluvial flood risk and at either medium pluvial flood risk or no pluvial flood risk.

Affected property is in a low-lying area, with land sloping down from the north, west and south (Flow paths are shown in Fig.12). Drains close to the road junction between Woodbridge Road and Grundisburgh Road were reported to have started to overflow

by 9.30am on the 20th October, contributing to the flooding of the road. At 12.30pm, sewer manholes were reported to be surcharging with fountains of water emerging from gullies and sewers. Two gullies in Grundisburgh Road were reported to be completely blocked in customer reports. SCC Highways maintenance records for the gullies closest to affected property in Grundisburgh Road show that these gullies were in operational condition prior to Storm Babet, but were not operational at the next maintenance visit afterwards, indicating they may not have been fully functioning at the time. However, due to the extreme rainfall conditions, the capacity of the wider drainage system, even if fully functioning, would have been limited and its design capacity would have been exceeded.

The tributary to the River Lark overtopped to the north of affected property. This floodwater merged with floodwater flowing to the west from the River Lark, which had also overtopped. This floodwater merged further with surface floodwater on land and the highways. The flow was sufficient to knock down boundary fences on Grundisburgh Road, with flooding being exacerbated by wash from large vehicles on the road. Internal floodwater levels in this area reached approximately 20cm. Floodwater entered property on the south side of Grundisburgh Road at approximately 2pm on 20th October. Flooding also entered property in this area via lower-level driveways.

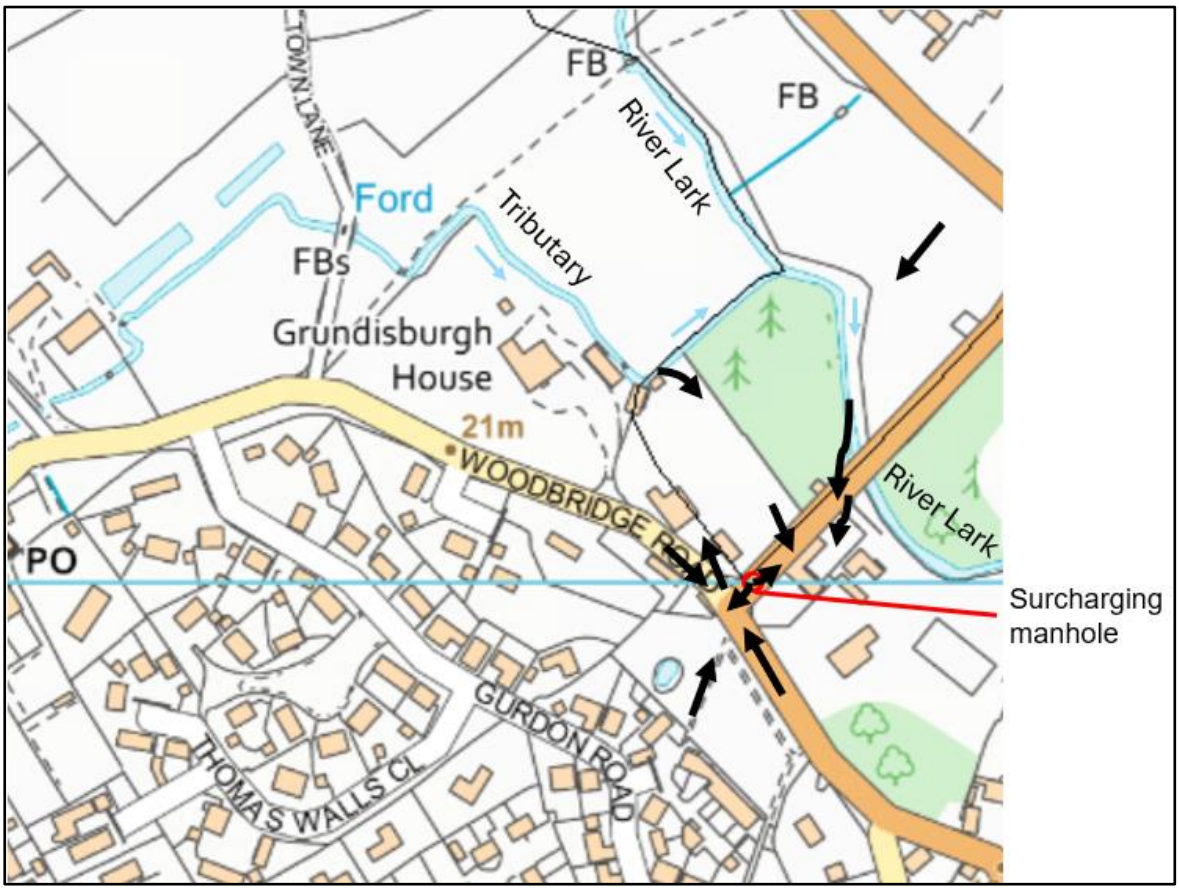


Fig. 122. Approximate flood water flow paths surrounding the Woodbridge Road and Grundisburgh Roard (B1079) road junction

In summary:

- Drains and sewers were reported to have surcharged in Grundisburgh Road and two gullies were reported to be blocked.
- The tributary to the River Lark overtopped north of Grundisburgh Road and floodwater flowed south.
- Surface water flowed across adjacent fields towards Grundisburgh Road.
- The River Lark overtopped, contributing to floodwater flowing west towards Woodbridge Road.

Recommended actions:

- Residents to install Property Flood Resilience (PFR) measures.
- Suffolk Highways to investigate the drainage system in the vicinity of affected property.
- Anglian Water to investigate the drainage and sewer system in the vicinity of affected property.
- Explore potential natural flood management measures (eg. leaky dams, attenuation ponds and flood plain reconnection) to “slow the flow” and attenuate water in the upper catchment of the River Lark and on surface water flow paths to the north of the River Lark bridge on Grundisburgh Road.

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
East Suffolk District Council	Local Planning Authority & Asset Owner
Internal Drainage Board (IDB)	Supervising land drainage and flood defence works on ordinary watercourses
Anglian Water	Asset Owner
Non-Risk Management Authority	**Relevant Flood Risk Function(s)**
Private Landowners	Riparian Responsibilities and management of water from land or/ watercourses
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.

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	SCC LLFA	SCC published "Flood Smart Living" web guide and handbook designed to increase flood resilience for residents, landowners and communities, December 2024

Suffolk Highways to investigate the functioning of the drainage system in the vicinity of the junction between Grundisburgh Road and Woodbridge Road	SCC Highways	Gullies on Woodbridge Road received a jetting visit April 2024. They have subsequently received a cyclic cleanse in December 2024. Further investigation of the drainage system around the junction to be conducted.

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 Grundisburgh. 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	Grundisburgh 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 is currently no active PFR schemes being managed by the LLFA in Suffolk.
Suffolk Highways to investigate the functioning of gullies surrounding The Green	SCC Highways	6 months	
Suffolk Highways to investigate the functioning of the drainage system in the vicinity of the junction between Grundisburgh Road and Woodbridge Road	SCC Highways	6 months	Gullies on Woodbridge Road received a jetting visit April 2024. They have subsequently received a cyclic cleanse in December 2024. Further investigation of the drainage system around the junction to be conducted.
Anglian Water to investigate the functioning of the surface water drainage and sewer system in the vicinity of the junction between Grundisburgh Road and Woodbridge Road.	Anglian Water	6 months	
Medium Term Actions (e.g. longer planning timescales and potential need to source funding but potential for greater impact)			
Explore potential natural flood management measures (eg. leaky dams, attenuation ponds and flood plain reconnection) to "slow the flow" and attenuate water west of The Green in the upper catchment of the tributary and on surface water flow paths.	Landowners, supported by relevant authority, resource dependant (SCC LLFA, EA)	12-24 months	

Explore potential natural flood management measures (eg. leaky dams, attenuation ponds and flood plain reconnection) to “slow the flow” and attenuate water in the upper catchment of the River Lark and on surface water flow paths to the north of the bridge on Grundisburgh Road over the River Lark.	Landowners, supported by relevant authority, resource dependant (SCC LLFA, EA)	12 - 24 months	
Long Term actions (significantly longer timescale and budget required with potentially greater positive impact)			
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.

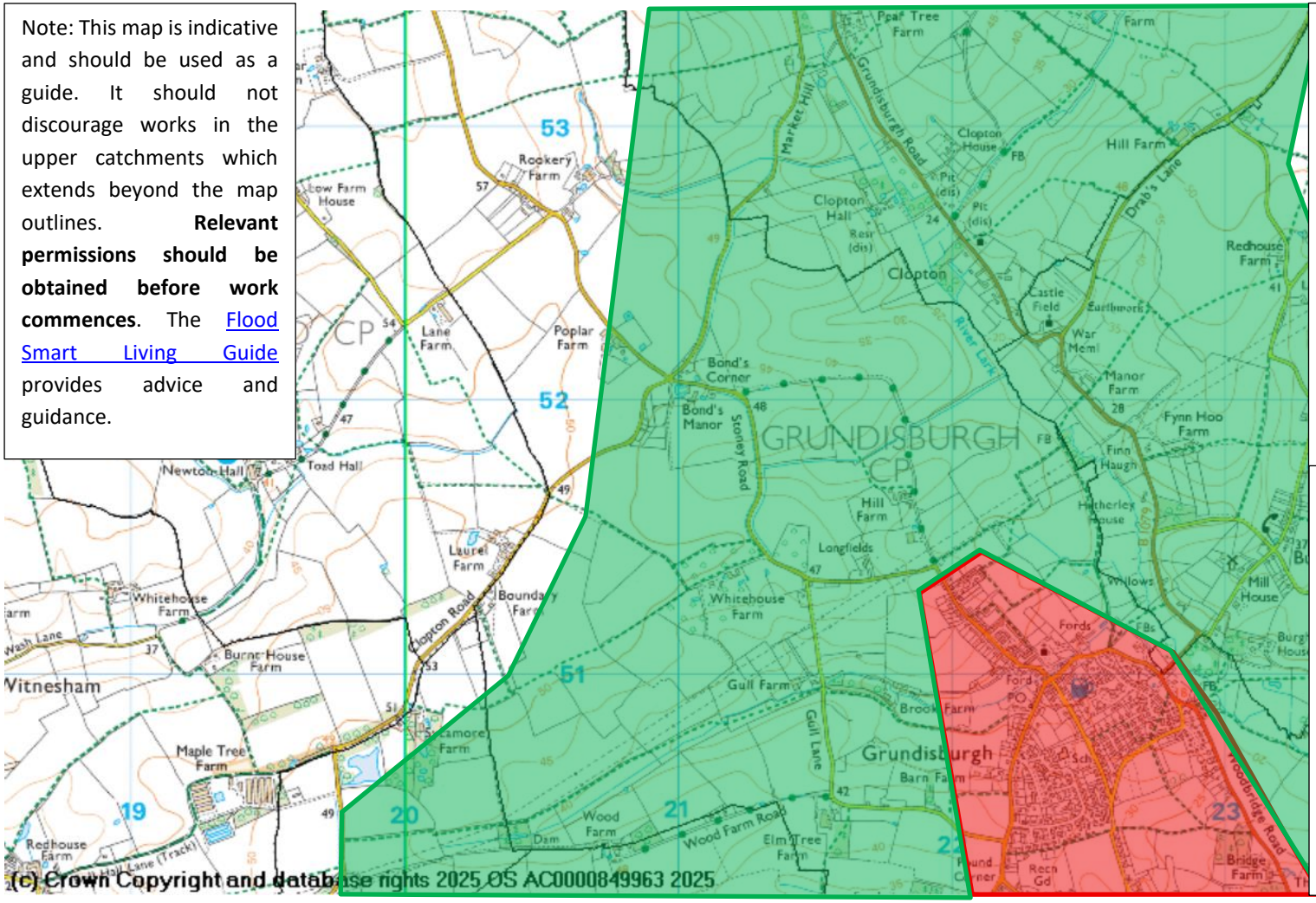
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the time of preparation and Suffolk County Council expressly disclaims responsibility for any error in, or omission from this report arising from or in connection with those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

Suffolk County Council forbids the reproduction of this report or its contents by any third party without prior agreement.

Appendix A – Indicative locations for NFM and watercourse maintenance

Note: This map is indicative and should be used as a guide. It should not discourage works in the upper catchments which extends beyond the map outlines. **Relevant permissions should be obtained before work commences**. The Flood Smart Living Guide provides advice and guidance.



Red – Urban locations where watercourses should be kept clear and water free flowing.

These locations are vulnerable to flood risk and are where the most impact is experienced during an event. Drainage features are constrained with limited space for water and overwhelming of features may lead to flooding. Important to ensure water can flow through the systems with limited restrictions.

Green – Rural locations where NFM Features could be considered.

These locations typically have more space to manage flood water and measures could include attenuation features, bunds around fields where surface water runoff occurs, and leaky dams in watercourses to slow the speed of water before it reaches the urban area.