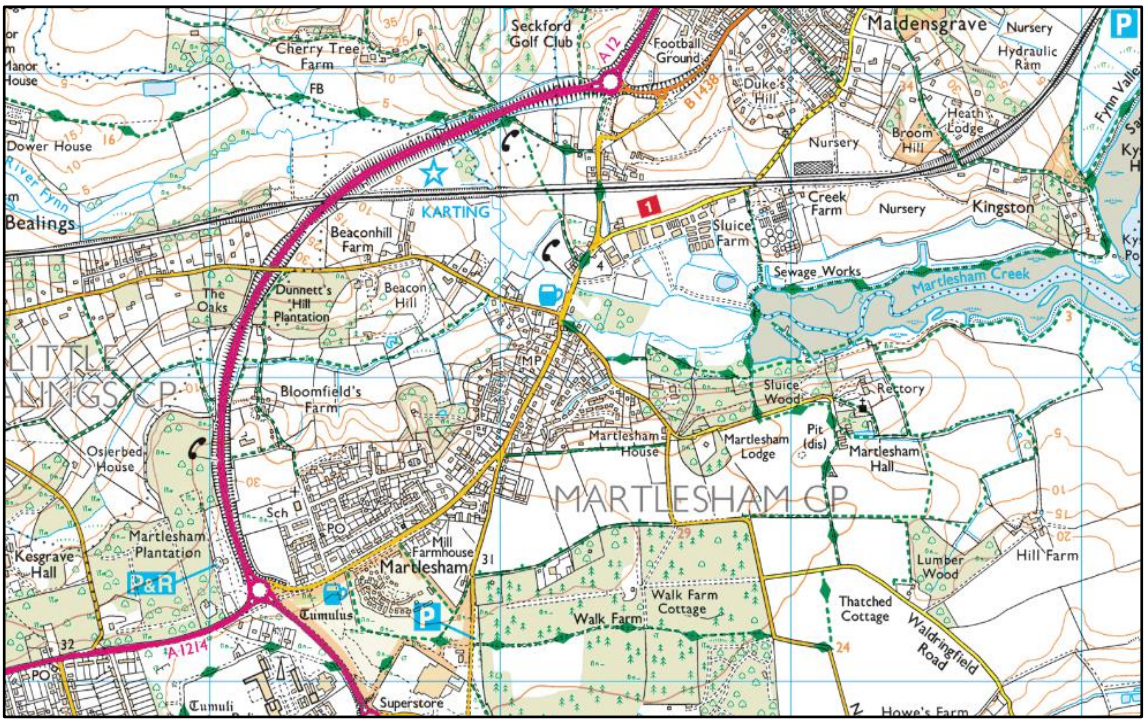
Section 19 Flood and Water Management Act 2010

Martlesham 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. Martlesham was a community that was 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.

Martlesham is located in an area at 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. The low-lying nature of Martlesham at the bottom of the catchment of the rivers Lark and Fynn means that during high rainfall events, considerable overland flowpaths converge upstream and flow into the main river bringing floodwater in close proximity to properties in the village. The local geology and soils are susceptible to high run off, making a number of properties in the village vulnerable to flooding due to intense rainfall events.

Storm Babet delivered significant rainfall to the catchment, following a period of above average rainfall. The impact within Martlesham was acute and centred around properties in close proximity to the river Fynn. 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 is provided within the report, outlining the context of the event and the impact. Key findings are that Martlesham was severely impacted by flooding due to it being the low point of the catchment, where all the water collected within the surrounding higher ground ultimately drains and flows out into the Deben estuary. During high rainfall events, considerable overland flows converge towards the village which can overwhelm the natural flow routes and the capacity of watercourses and drainage infrastructure.

Short, medium and longer term recommendations have been published and each have a potential role to improve resilience and reduce the risk of flooding in Martlesham. For short term measures, key highlights include the implementation of a community flood plan and installing Property Flood Resilience (PFR). For medium to longer term recommendations, there is emphasis on the management of water from rural land through new natural flood management features and riparian landowners to carry out watercourse maintenance where appropriate 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 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 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 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.

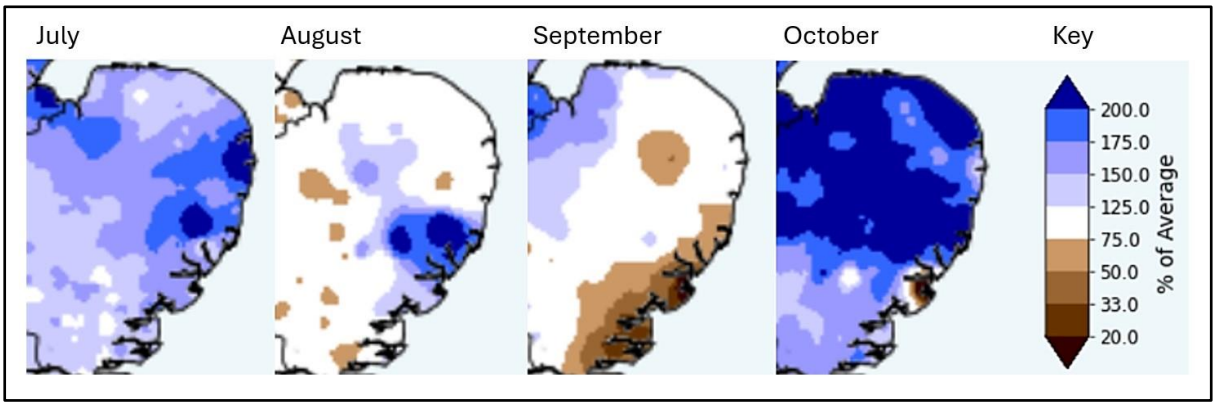


Figure 1. Average rainfall in East Anglia between July and October 2023 (as a percentage of the historical average monthly rainfall)

The following report acknowledges that October 2023, and in particular Storm Babet, was an extreme event and will assess the 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 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

Martlesham is a small village in East Suffolk, located approximately 6 miles east of the county town of Ipswich. It is situated close to the confluence of the river Deben with one of its tributaries the river Fynn. Martlesham is in the district of East Suffolk Council.

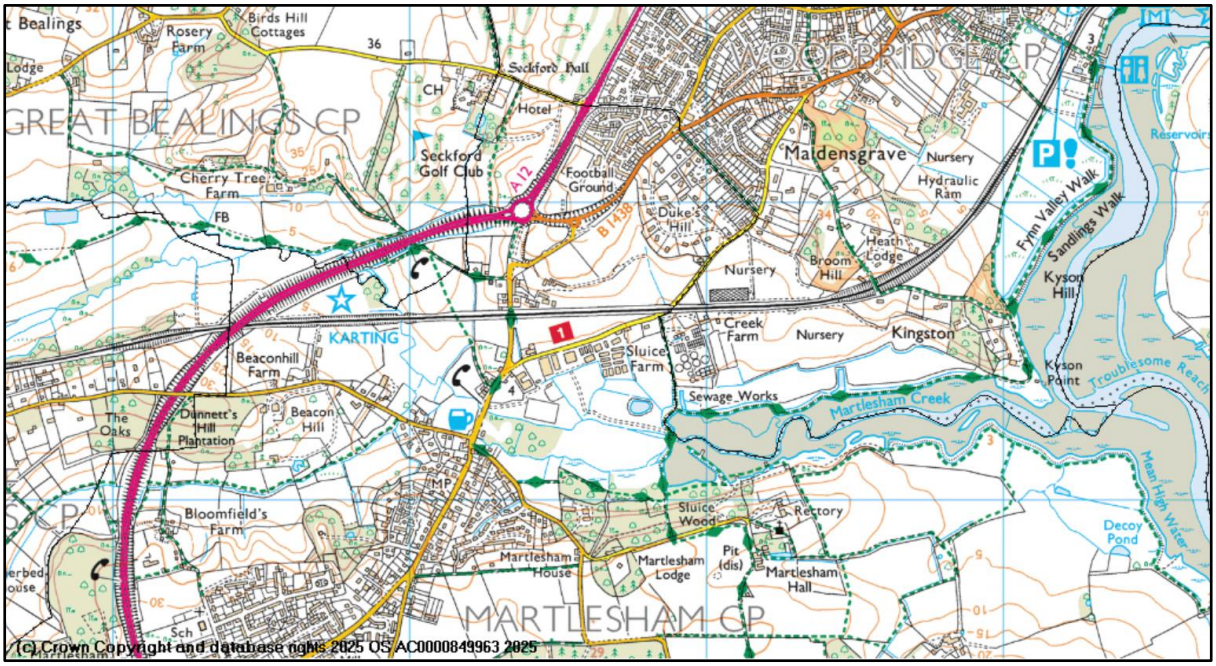


Figure 2. Investigation area map

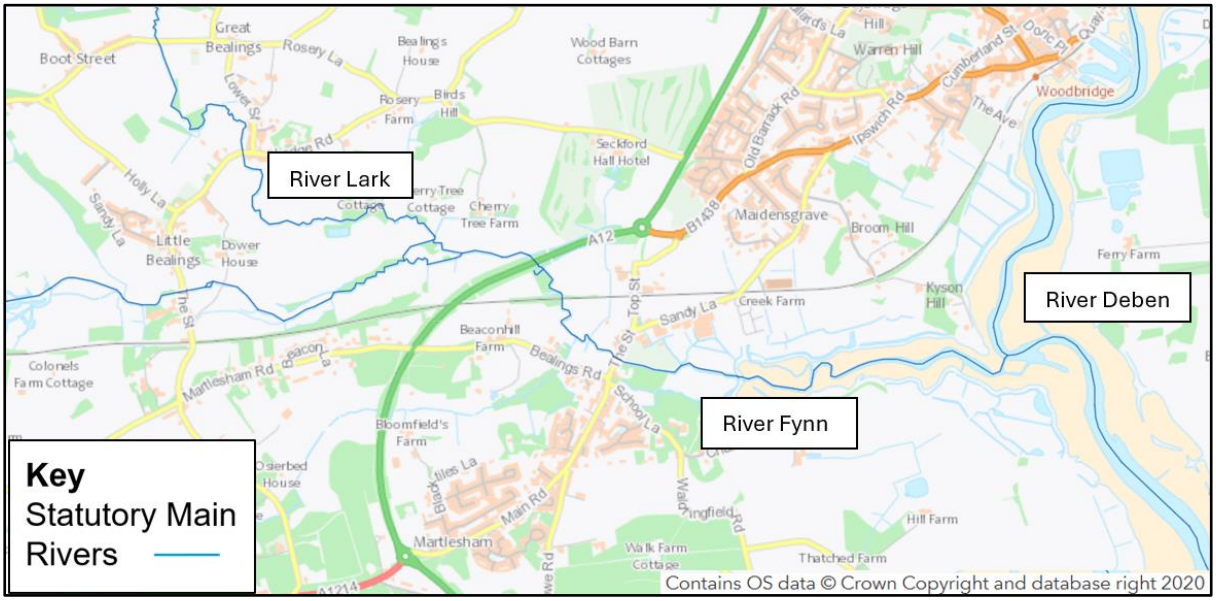


Figure 3. Location of statutory main rivers and significant ordinary watercourses near Martlesham

Figure. 3 shows the most significant watercourses in the area surrounding Martlesham. These include the river Fynn, the Lark and the Deben, all statutory main rivers.

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 relate to 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.

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 properties, residential and commercial, across the county from various flooding sources. Martlesham was impacted with approximately 7 properties reporting internal flooding. Flood water was described as coming from the overtopping of the river Fynn (fluvial) and overwhelmed sewerage and drainage systems.

3. Records of any historical flooding

A review of Suffolk County Council's highway reporting tool, Environment Agency and Anglian Water records, indicate that Martlesham has been occasionally impacted by flooding in the past.

The Environment Agency hold no historic records of flooding for Martlesham.

Anglian Water records suggest a history of loss of toilets and external floodings, often caused by blockages or extreme rainfall events.

Suffolk Highways receive a number of reports about drainage issues each year. Mostly ponding and flooding on roads. There was one previous internal flooding issue reported in 2016. Drainage improvement works were completed in 2019/20.

4. Predicted Flood Risk

Several areas of Martlesham show flood varying risk from pluvial and fluvial sources.

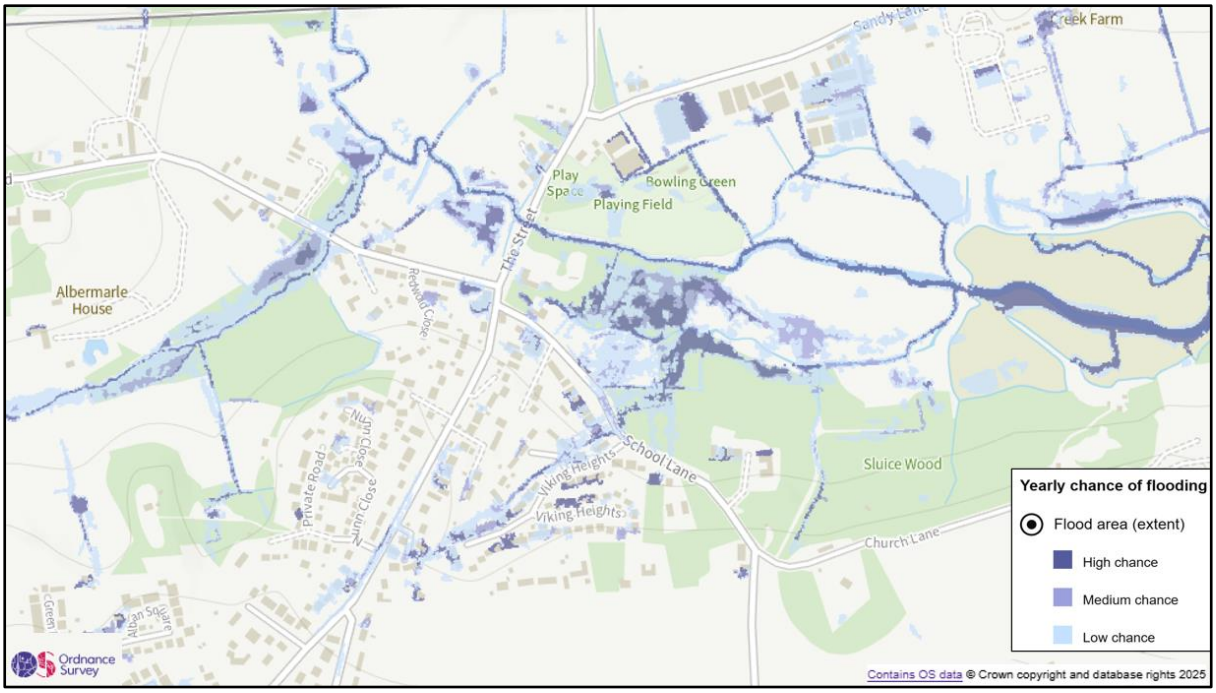


Figure 4. Surface water flood risk

Figure 5 highlights the pluvial (surface water run-off from surrounding land and highways) flood risk in Martlesham. Several surface water flow paths traverse across Martlesham and into the river Fynn, upstream and downstream of the road bridge on The Street. Sections of The Street and Post Office Lane are characterised as having a low chance of surface water flooding. With one isolated area shown at being high chance. These two areas were affected by flooding during Storm Babet.

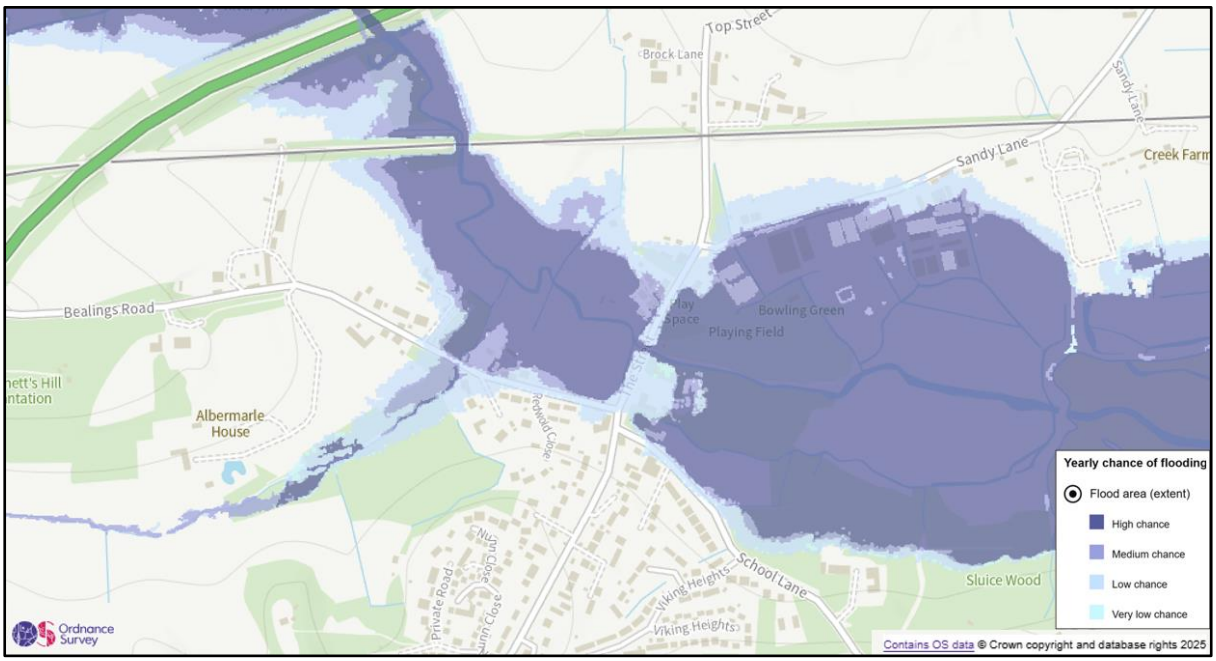


Figure 5. Flood risk from rivers and sea

Figure 6 shows the fluvial (from designated main river and ordinary watercourses) flood risk in Martlesham. Fluvial flood risk is associated with the river Fynn which flows just north of the centre of Martlesham. Parts of The Street and Post Office Lane have a yearly chance of fluvial flooding ranging from low to high. Properties on The Street and Post Office Lane were affected by flooding during Storm Babet.

5. Catchment characteristics

The village of Martlesham is situated close to the river Deben tidal estuary. At is at the bottom of the catchment for the river Lark and the river Fynn. Martlesham sluice controls the flow of the river Fynn into the river Deben at Martlesham Creek and marks a tidal limit of the Deben.

The low-lying nature of Martlesham, being the low point of the catchment where all the water collected within the surrounding higher ground (the catchment) ultimately drains and flows out into the Deben estuary, means that during high rainfall events, considerable overland flows converge towards the village. Overwhelmed drainage infrastructure and watercourses may be observed during these intense rainfall events.

Figure 7 shows the topography and gradient changes surrounding Martlesham. The north of the village is situated in the valley of the river Fynn before it flows into Martlesham Creek. Its elevation is lower than the surrounding land to the north and south. One of the lowest points is along The Street at the river crossing. This location was affected by flooding during Storm Babet.

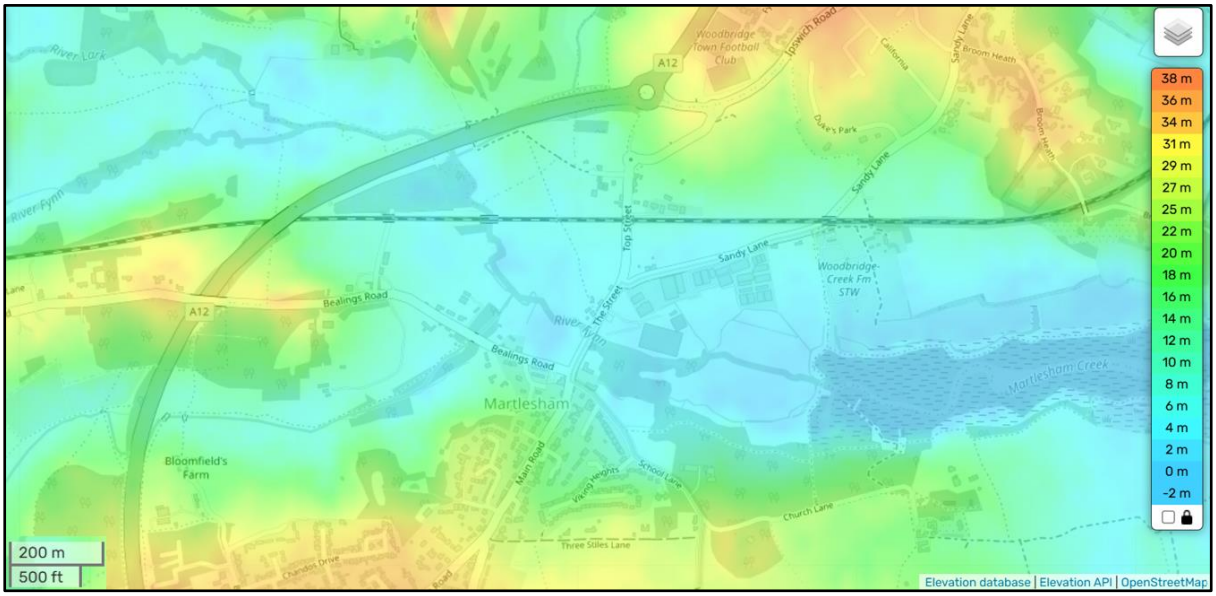


Figure 6. Martlesham and surrounding topography (TessaDEM as cited in topographic-map.com)

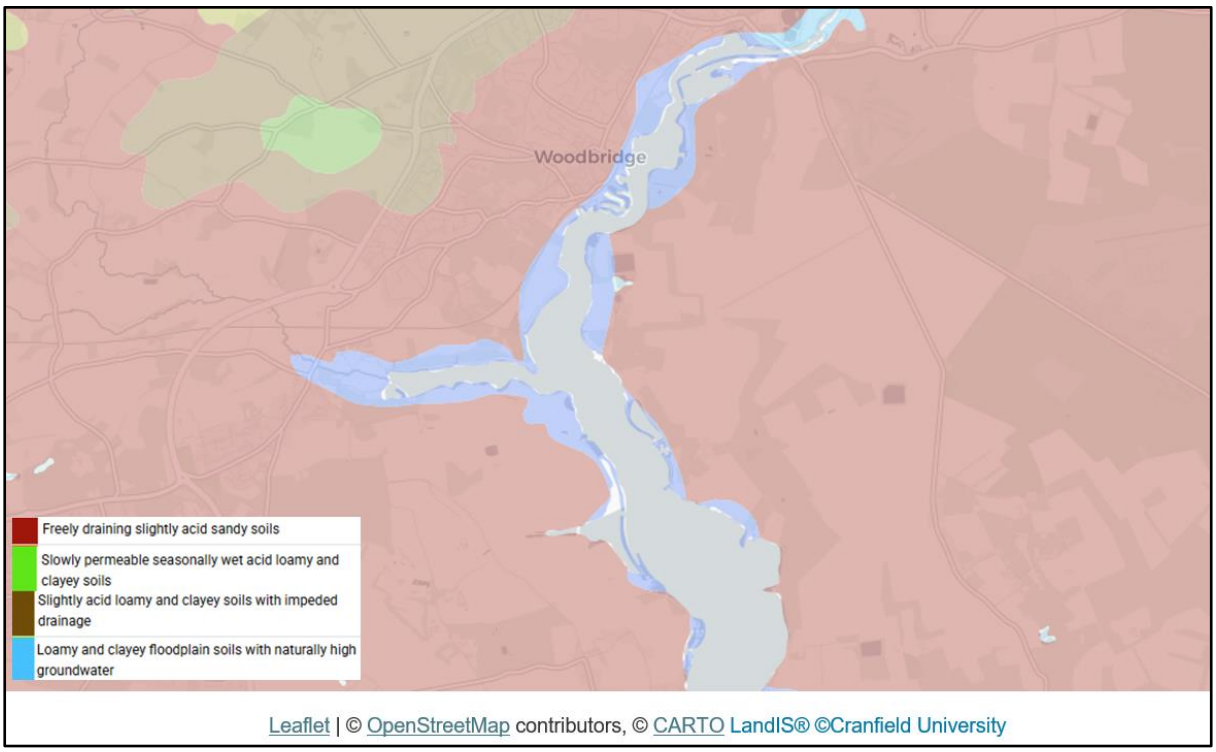


Figure 7. Soil map (LandIS Soilscapes)

The soils more generally surrounding Martlesham are freely draining, slightly acid sandy soils. The village itself is situated on a mixture freely draining soils and floodplain soils surrounding the river Fynn which usually have naturally high groundwater and tend to be wetter.

During short term intense rainfall events, soil composition and geology can become influential in affecting the volume of surface water runoff. Combined with the local topography and being situated at the bottom of the catchment, these make Martlesham more susceptible to flooding in extreme rainfall events. Already saturated ground and high rainfall, like that of Storm Babet, will further emphasise the vulnerability of the village to localised flooding.

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

storm Babet was an unprecedented event which came at a time when Suffolk had experienced a significant amount of rainfall in the preceding week.

Storm Babet delivered significant rainfall in the catchment between 19 and 20 October. The nearest rainfall gauge to Martlesham is in Woodbridge. At the Woodbridge rainfall gauge there was 52.4mm of rain recorded over a period of 17hrs between 19 Oct and 20 Oct. More than half (31.4mm) of the rainfall was received in just over 4hrs between 06:45am to 11:00am on 20 October.

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

Flood Alert – Flooding is possible. Be prepared. - usually issued between 2 and 12 hours before flooding.

Flood Warning - Flooding is expected. Immediate action required – usually issued 30 minutes to 2 hours before flooding.

The Flood Alert for the Rivers Deben and Lark covers parts of Martlesham at risk of flooding from the river. This Flood Alert was issued on 18th October 2023 at 22:12pm and remained in force until it was removed on 24th October 2023.

Areas of Martlesham are also within the Flood Warning Area of The River Lark from Clopton to Martlesham. This Flood Warning was issued on 20th October 2023 at 10:14am and remained in force until it was removed on 24th October 2023. It should be noted that this Flood Warning area has been expanded following Storm Babet and now includes additional properties which previously were able to receive warning of tidal flooding only but may also now benefit from fluvial flood warnings.

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) 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 and information gathered by Risk Management Authorities (RMAs) and the community.

Detailed description of the investigation area can be found in the following section.

The Street and Post Office Lane

The primary cause of flooding on The Street and Post Office Lane was fluvial flooding. On 20 October 2023, intense rainfall caused huge amounts of floodwater to flow down from the upper catchments of the river Lark and the river Fynn towards Martlesham. The internal flooding on The Street and Post Office Lane was caused by the river Fynn overtopping and flowing directly across gardens, roads and into properties.

Residents reported the speed of the flooding was very fast. From 5:30pm the river began overflowing onto the land to the north and by 8:30pm, floodwater was entering properties and flowing further onto Post Office Lane (see Figure 9). The layby in front of Post Office Lane was entirely submerged. Residents also reported the properties in the area suffered a complete power cut around this time, making the situation even more difficult and dangerous. Floodwater levels continued to rise until midnight.

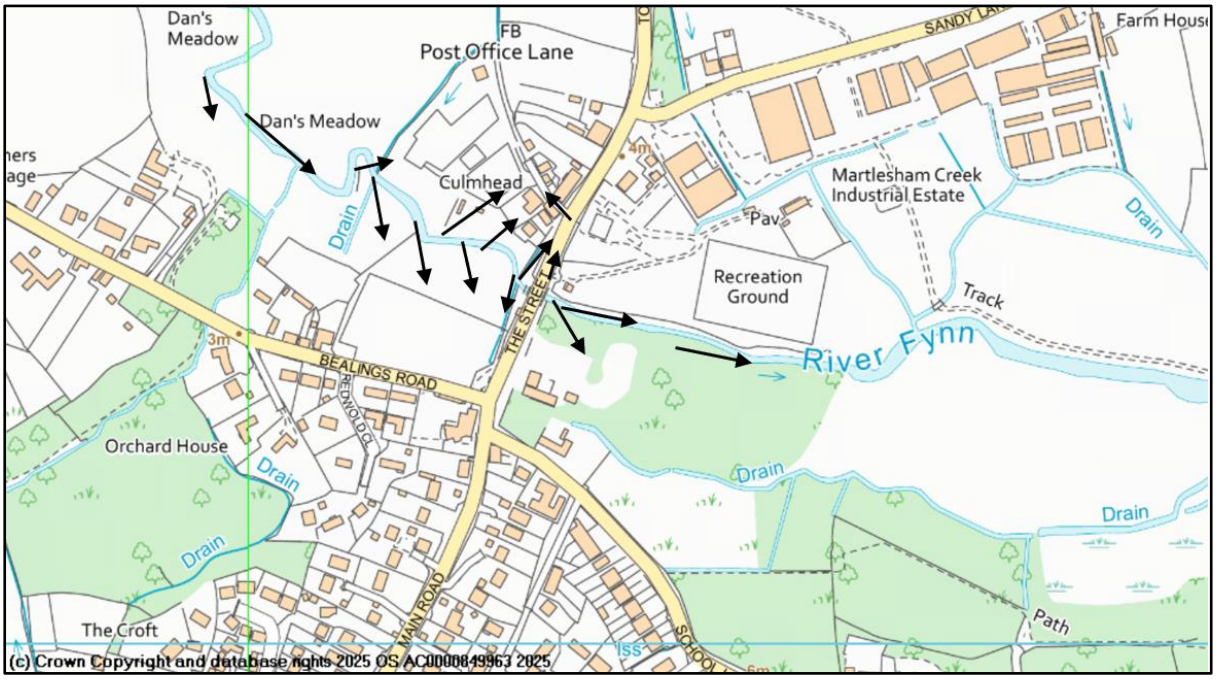


Figure 8. Approximate flood water flow routes affecting The Street and Post Office Lane

On the day of the flooding, the high tide at Woodbridge was at approximately 4:30pm. The sluice gate at Martlesham Creek (through which the river Fynn flows out to the Deben tidal estuary) is a passive structure without external power supply, which operates in relation to the relative fluvial and tidal water levels. At high tide the pressure of the tidal waters closes the gates to protect the upstream freshwater environment from undesirable saltwater incursion. This natural tide locking would explain the rapid rise in floodwater experienced from 5:30pm onwards.

The Environment Agency visited the Martlesham Sluice as part of its river run activity in advance of Storm Babet. This is when structures and pinch points are visited to check that they are clear prior to forecast heavy rain. Ad hoc clearance works may be carried out at this time if deemed necessary.

The road bridge on The Street may have created an additional restriction to the large floodwater levels flowing through the Fynn. Structures within watercourses can cause a restriction and slow the flow during extreme rainfall or flooding events. With larger flow conditions it is also more likely that bridges and culverts can get blocked with loose debris and waste. During 'normal' flow conditions, the bridge capacity here is deemed to be sufficient.

The highway drainage gullies outside the front of some properties on The Street were observed to be overflowing and the floodwater went into the properties. The drainage capacity was likely exceeded due to the amount of floodwater in the system and also due to the fact the outfalls through which they drain into the river Fynn were fully submerged by the water levels in the channel. The vast extent of pooling floodwater on the highway had nowhere to go. The drainage gullies in this area had been cleaned and jetted in the August prior to Storm Babet and were found to be operational.

One property was flooded internally up through the toilet and bath. It is possible this is one of the lowest points on the sewer network. Anglian Water believe the sewer was overloaded from the rainfall and that it was likely that surface water runoff entering the sewer played a big part in overloading it.

Another contributing cause cited by the community, was poor maintenance of the river Fynn. The section of river upstream of the road bridge on The Street was blocked with overgrown vegetation, fallen trees and silt and that no maintenance and been carried out in recent years. This may have had a cumulative effect of reducing the capacity of the channel in this location and contributing to the flooding experienced.

The Environment Agency has permissive powers to undertake maintenance, improvement, or construction works on main rivers where it supports flood risk management and environmental protection. The location is not an area the Environment Agency currently undertake routine maintenance and current flood risk modelling indicates increase in vegetation has limiting influence on property flood risk. Where the Environment Agency does not exercise its permissive powers, the responsibility reverts to the riparian landowner.

The fluvial flood risk to properties in this area ranges from a medium to high chance of flooding from the river each year (see Figure 11). The flood extents shown on the national flood mapping aligns with the observed floodwater limits seen during Storm Babet.

In Summary:

- Internal flooding on The Street and Post Office Lane was caused by the river Fynn overtopping and flowing directly across gardens, roads and into properties.
- Properties in the area suffered a complete power cut.

- The sluice gate at Martlesham Creek closed with the high tide, holding up the flow of the river for a time.
- The road bridge on The Street may have created an additional restriction to the large floodwater levels flowing through the Fynn.
- The highway drainage gullies were observed to be overflowing as the drainage capacity was likely exceeded due to the amount of floodwater in the system and also due to the fact the outfalls were fully submerged by the water levels in the channel.
- The sewer network was overloaded and at least one property was flooded internally up through the toilet and bath.
- A lack of maintenance of the river Fynn may have reduced the capacity of the channel in this location and contributed to the flooding experienced.

LLFA recommended action(s):

- Residents to install Property Flood Resilience (PFR).
- Investigate potential NFM projects to 'slow the flow' and attenuate water on overland flowpaths in the fields southwest of the river Fynn and Bealings Road (leaky dams, restoration of watercourses, storage ponds etc.).
- Suffolk Highways to ensure the completion of highway drainage asset cyclic maintenance on The Street and Post Office Lane.
- Report any observed blockages below the road bridge on The Street on the Suffolk Highways Online Reporting Tool.
- Riparian landowners to carry out appropriate watercourse maintenance through Martlesham to reduce flood risk as necessary as per their riparian responsibilities.

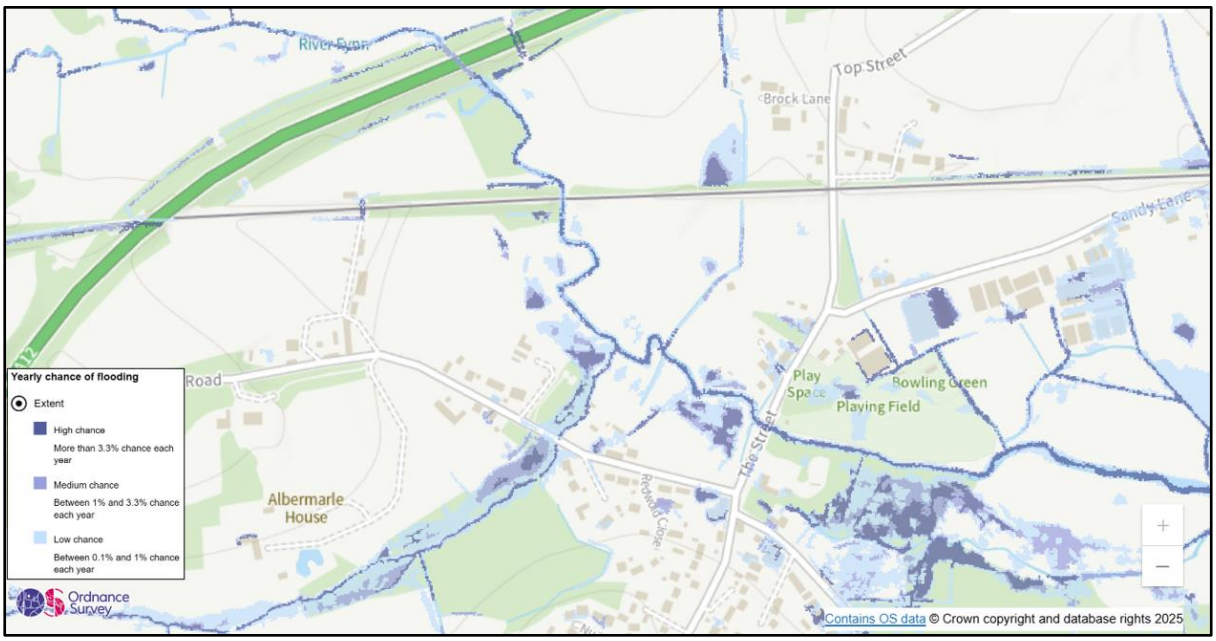


Figure 9. Surface water flood risk on The Street and Post Office Lane

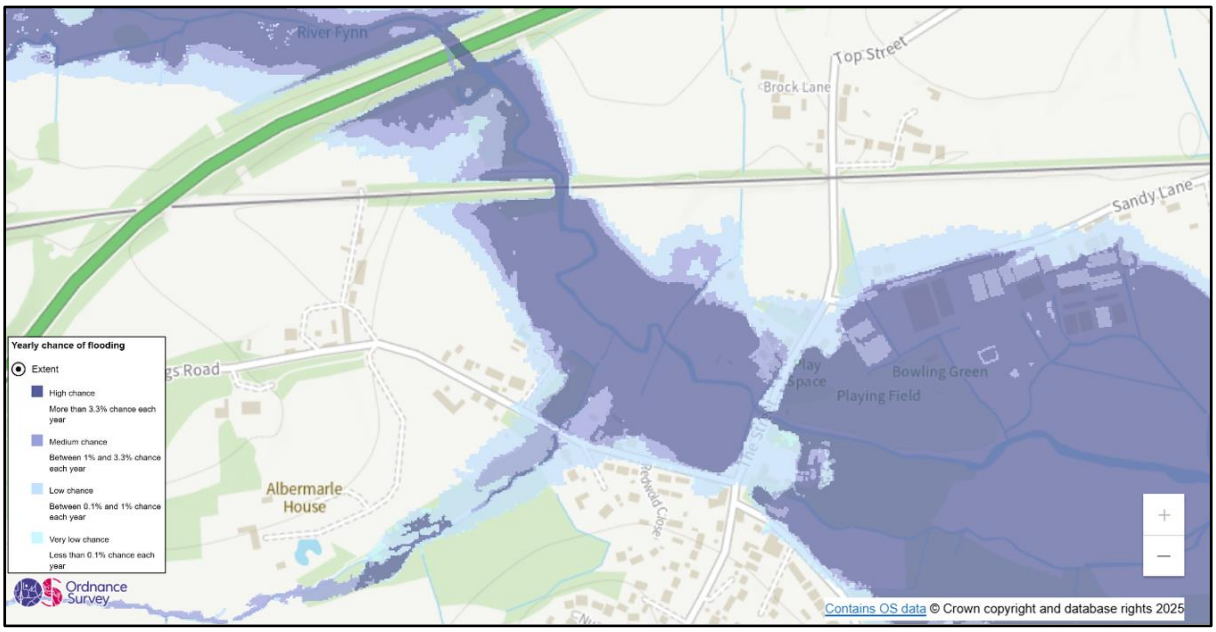


Figure 10. Flood risk from rivers and sea on The Street and Post Office Lane

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 the location 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 (LLFA), Highways Authority & Asset Owner
The Environment Agency (EA)	Lead organisation for providing flood risk management under its permissive powers and issuing warnings of flooding from main river
Anglian Water	Asset owner supplying water and water recycling services
East Suffolk District Council	Local Planning Authority (LPA) & Asset Owner
Internal Drainage Board (IDB)	Supervising land drainage and flood defence works on ordinary watercourses
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
Martlesham 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	Risk Management Authority	Progress
Offer of Property Flood Resilience (PFR) measures to the properties that flooded during Storms Babet	Suffolk County Council Lead Local Flood Authority	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.	Suffolk County Council Lead Local Flood Authority	SCC published "Flood Smart Living" online and hard copy guide to increasing flood resilience for residents, landowners and communities, December 2024
Understand the annual event probability of the rainfall & river flow across the region	Environment Agency (EA)	Details of the report can be found on the SCC website or at the following https://www.suffolk.gov.uk/roads-and-transport/flooding-and-drainage/storm-babet
Cyclic cleansing 24/25 completed January 25. Next cycle planned December 25 to January 26.	Suffolk Highways	Complete

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 Martlesham. 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	Martlesham Parish Council	6 months	
Residents to consider installing Property Flood Resilience (PFR) measures to property to reduce damage caused by flooding.	SCC LLFA / 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 scheme being managed by the LLFA in Suffolk.
Suffolk Highways to ensure the completion of highway drainage asset cyclic maintenance on The Street and Post Office Lane	Suffolk Highways	Annually	

Report any observed blockages below the road bridge on The Street on the Suffolk Highways Online Reporting Tool.	General Public, Landowners, Suffolk Highways	N/A	
Riparian landowners to carry out appropriate watercourse maintenance to reduce flood risk as necessary as per their riparian responsibilities (See Appendix A).	Riparian landowners	N/A	Further information on Riparian Ownership can be found within SCC published "Flood Smart Living" handbook. This applies to both ordinary watercourse and main river.
Medium Term Actions (e.g. longer planning timescales and potential need to source funding but potential for greater impact)			
Explore potential NFM projects to 'slow the flow' and attenuate water on overland flow paths in the fields southwest of the river Fynn and Bealings Road E.g. leaky dams, woody debris installation, restoration of watercourses, storage ponds, wetland areas	Landowners, supported by relevant authority, resource dependant (SCC LLFA, EA, IDB)	12 - 24 months	
Investigate opportunities to update development plan policy in Neighbourhood Plans or any potential Joint Local Plan site allocation(s) which identify risks and opportunities to mitigate flood risk issues as	Local Planning Authority, SCC LLFA	12 months+	

development comes forward			
Long Term actions (significantly longer timescale and budget required with potentially greater positive impact)			
Installation of NFM features to attenuate and slow flood water if investigation works suggest it is viable	Landowners, supported by relevant authority, resource dependant (SCC LLFA, EA, IDB)	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.

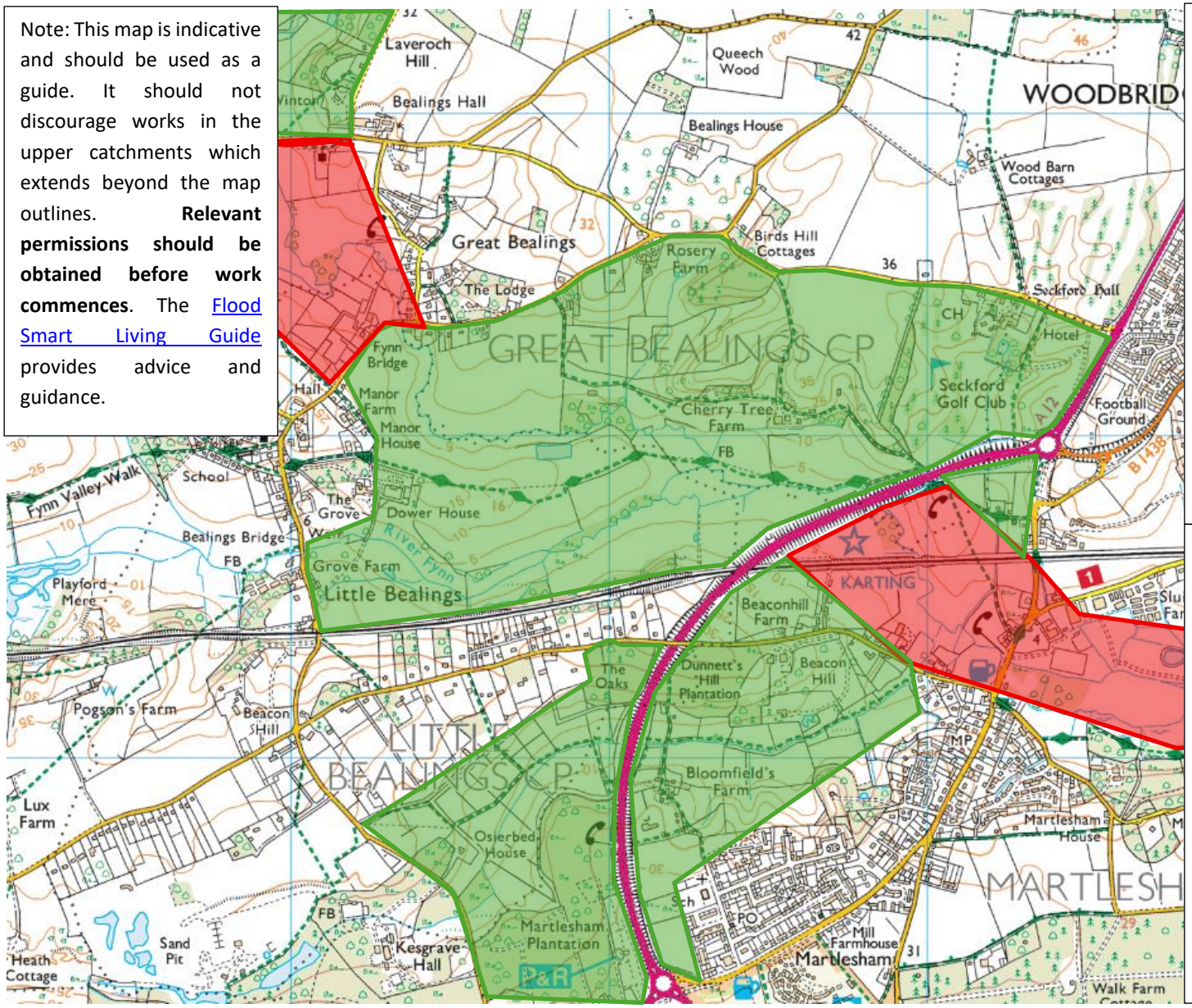
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the time of preparation and Suffolk County Council expressly disclaims responsibility for any error in, or omission from this report arising from or in connection with those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