

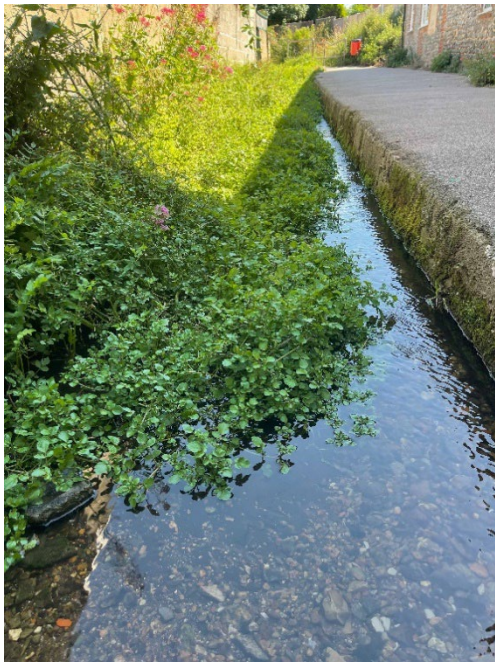


# Norfolk County Council

## Investigation Report: Countywide Flooding, August and September 2020

Report Reference: FIR063

Draft Report prepared by Mark Henderson and Christopher Robinson on 09 November 2022



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## Executive Summary

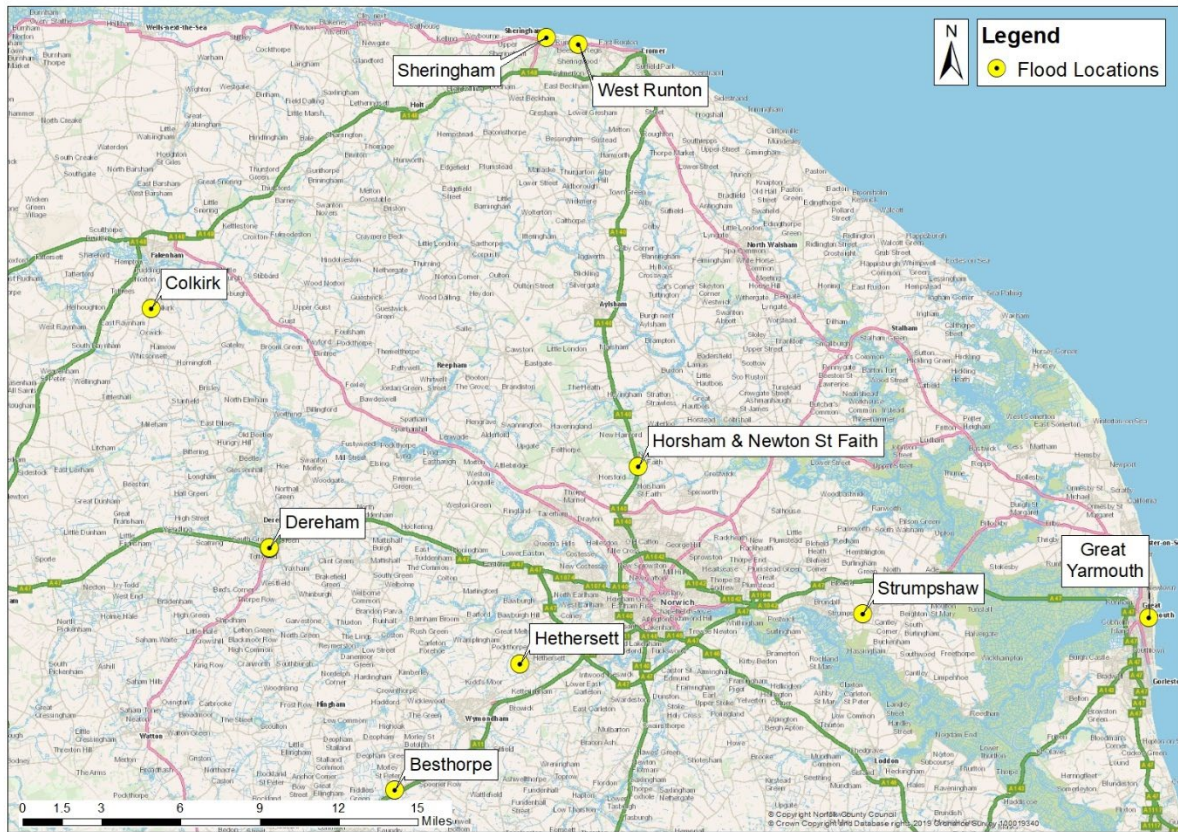
### Background

This report summarises the investigation into flooding in August and September 2020. 766 reports of flooding were received by Norfolk County Council (LLFA) in the financial year 2020/2021, with 448 on these reported as internal flooding. The majority of these reports were due to a significant event on 24/25th December 2020 where over 350 properties were flooded, and 120 settlements affected. This report has been delayed due to resources being redeployed to respond to the December 2020 event.

### Flooding Incidents and Causes

This report summarises the causes and recommendations in relation to internal flooding of ten properties in August and September 2020. The flooding occurred across Norfolk at the following locations which are indicated in the table below:

<b>Location</b>	<b>Number of affected Properties</b>
Dereham.	2
Horsham St Faith and Newton St Faith.	1
Strumpshaw	1
West Runton	1
Colkirk.	1
Great Yarmouth	1
Besthorpe	1
Hethersett	1
Sheringham	1



Map showing Overview of Flooded Areas

The cause of flooding varied across locations and is summarised as including:

- a) Run-off from rainfall pooled at a low point where properties were located.
- b) Run-off from significant rainfall was concentrated along overland flow paths on which the affected properties were positioned.
- c) Surface run-off from significant rainfall made its way onto the highway and flowed along the road network and onto the accesses of affected properties that were situated lower than these features.
- d) Surface water was washed off public highway by vehicles.
- e) Run-off from rainfall was directed towards surface water drainage networks and these flows could not be accommodated, either because the system did not have capacity or due to obstruction in the system by debris.

## Key Recommendations

The findings of the investigation are detailed on the following pages. Following flooding to people, property, and infrastructure the following recommendations are made in three areas:

### **1. Risk Management Authorities should:**

- a) Communicate with affected residents where their assets have given rise to the flooding of properties.
- b) Review the appropriateness of their response to flooding.

c) Determine the integrity and/or capacity of their assets where they have contributed to the flooding of properties to understand the systems role in accommodating normal rainfall events as well as mitigating flooding.

**2. Property owners of affected properties should seek their own legal advice.**

**3. Norfolk County Council should:**

a) Incorporate all relevant information of actual flooding into the review of the Norfolk Preliminary Flood Risk Assessment (PFRA).

b) Review and monitor the delivery of recommendations within this and other relevant flood investigation reports.

## Justification for Flood Investigation

The purpose of this report relates to Section 19 of the Flood and Water Management Act 2010. This legislation sets out that the County Council, in its role as Lead Local Flood Authority for Norfolk, should investigate the role and response of organisations to significant flooding incidents. Significant flooding is deemed to be those incidents that impact upon people, property and infrastructure.

The Norfolk Local Flood Risk Management Strategy Policy UC2 (Flood Investigation) sets out the thresholds the Lead Local Flood Authority will apply to its formal flood investigation role. This states an investigation will be undertaken where it is determined that:

- 1) There is ambiguity surrounding the source or responsibility for a flood incident, and/or:
- 2) There is cause to investigate the flood incident, due to either its impact, or consequence

In judging the impact or consequence of a flood event Norfolk County Council uses the criteria set out below:

- a) Any risk to loss of life or serious injury.
- b) One or more residential or business property flooded internally.
- c) One or more critical services/installations and vulnerable person's properties flooded internally; and/or rendered inoperable or their functions severely compromised due to the access to the premises being impassable; and/or resulting in a loss of service impacting on the local community.
- d) Any section of a national category 3 road or above made impassable due to flooding: and/or flooding to priority 1 and 2 gritting routes.
- e) Flooding adversely impacting a rail link by making it impassable.

It was deemed necessary to complete a formal Investigation Report into the countywide flooding in August and September 2020 as:

- Multiple residential properties were internally flooded.
- Multiple commercial properties were internally flooded.

This impact met the County Council's threshold for undertaking a formal flood investigation and the flood investigation report aims to:

- i) Provide a transparent and consistent review of recent flooding.
- ii) Identify those organisations and individuals who have responsibility to manage the causes of the flooding.
- iii) Identify what their response has been or will be to the flooding.
- iv) Make recommendations as to how the flood risk could be mitigated or reduced.
- v) Provide new evidence of the level of risk faced by communities in Norfolk that can be used in current funding bids in support of flood mitigation schemes.

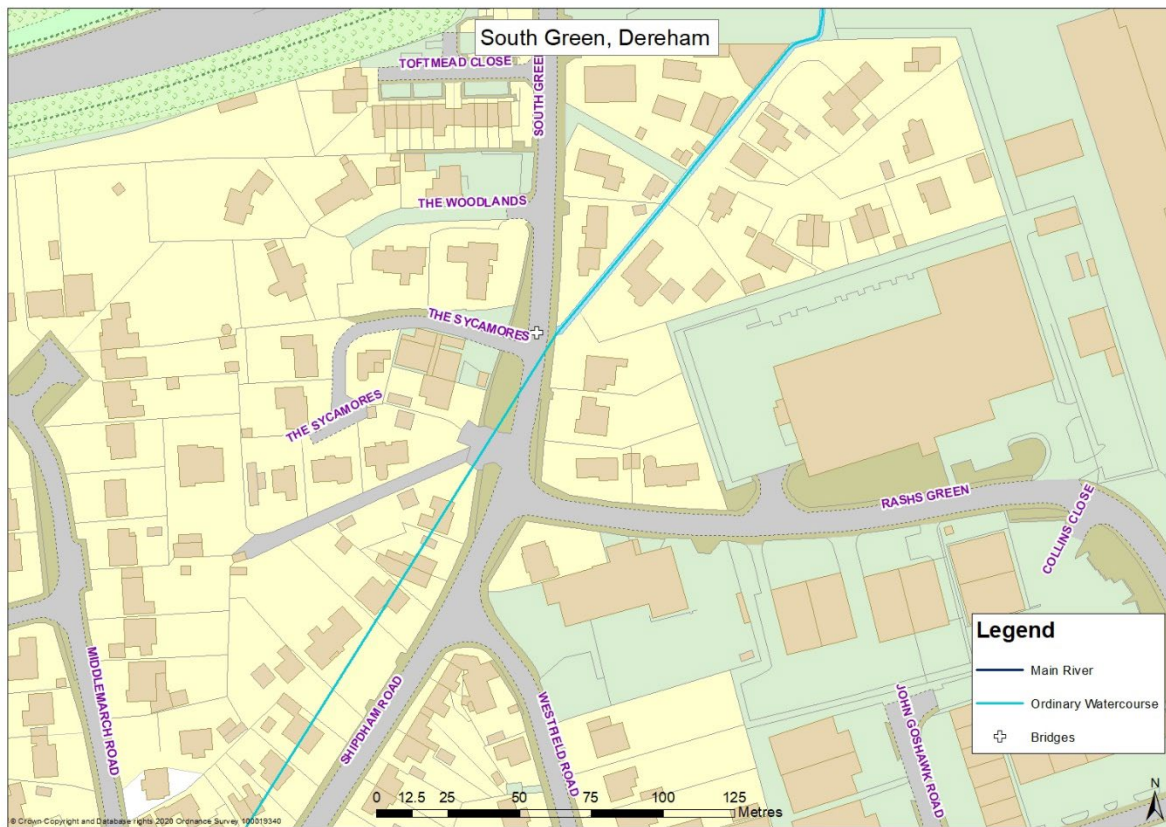
Mitigation measures include property level protection, reinstating lost drainage features, reviewing or increasing maintenance regimes and increasing the capacity of the drainage network.

The flood investigation report cannot:

- Resolve the flooding issues or provide designed solutions.
- Force authorities to undertake any of the recommended actions.

# Breckland District Council Area

## Flooding and Flood Risk Within Dereham



Map showing location of flooding

### Description of Catchment

This catchment originates in the largely rural area north of Dereham. The stream, with numerous tributaries, passes through the urban area east and then south of the Town Centre before outfalling into Scarning Fen.

### Flood Incidents Within this Catchment

Within this catchment two incidents of internal flooding have been assessed as part of this investigation. These incidents are detailed in the table below.

Date of Incident	Incident as reported	What was the response to the flood incident
25/09/2020	<p>On the 25/09/2020 - two properties were internally flooded on South Green, Dereham. This incident was reported by</p> <ul style="list-style-type: none"> <li>A resident via an online flood report form on the 11 November 2020, (2835)</li> <li>Norfolk County Council (Highways) via an electronic report on the 29 September 2020, (2856)</li> </ul>	<p>Norfolk County Council (LLFA) assessed validity and impact of the flood report after the incident.</p>



### Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns and two of the incidents (100%) of internal flooding in this catchment are within 2.5km of a rain gauge. Data from rain gauges located in Dereham have been analysed to ascertain the intensity of the rainfall event experienced in the catchment. The rainfall event recorded by gauges for this catchment is:

On 25 September 2020 48.8 mm of rainfall was recorded as falling in ten hours and three minutes at the East Dereham STW rainfall monitoring station. This intensity of rainfall for the total duration equates to a 1 in 12.5 (8% Annual Exceedance Probability) rainfall event.

### Historic Flooding Incidents Within the Catchment

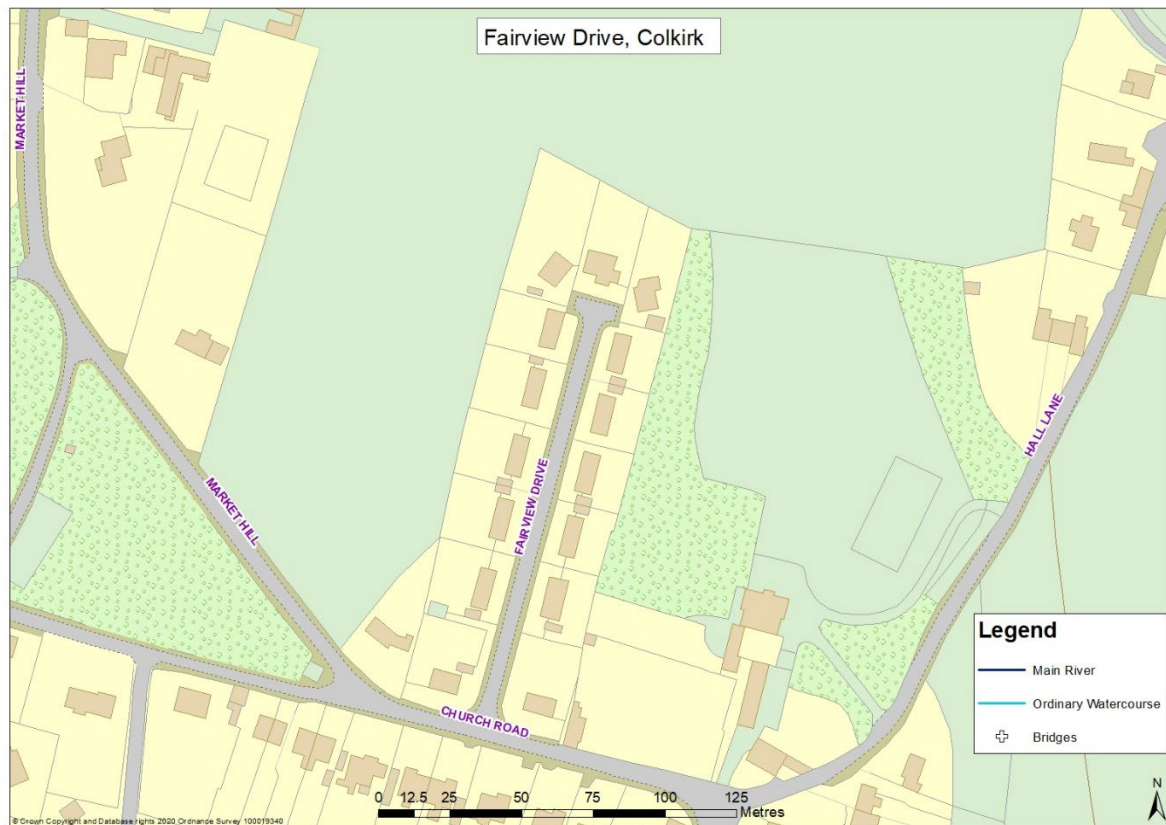
<b>Date of incident</b>	<b>Impact</b>	<b>Rainfall intensity</b>
2012	Flooding to external gardens in South Green	Not known
2016	Flooding to various properties on South Green	1 in 32 (3.1% AEP)

### Causes of Flooding Within the Catchment and Recommendations

The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

Location and date of flooding	Causes of flooding	Recommendation	Risk Management Authority/ Individual with Relevant Flood Risk Roles
<p>South Green, Dereham, 25/09/2020</p>	<p>Run-off from significant rainfall was concentrated along overland flowpaths on which the affected properties are positioned. Due to the nature of the topography of South Dereham a large area of urban run-off is directed north towards the Dereham Stream. This run-off is concentrated through the urban environment to meet flows channelled within and exceeding Dereham Stream that are heading to the south and southwest. These flows converge at the northern end of Shipdham Road and can only be conveyed away from properties when capacity in Dereham Stream is available.</p> <p>The amendments of principal drains and watercourses through canalising, straightening and culverting caused a loss of integrity and capacity. Therefore, the flows entering the ditches and watercourse as run-off or positive discharge could not be accommodated by the receiving watercourse. This caused water to exceed the channel capacity and overtop its banks.</p> <p>Flood flows made their way into the affected properties. Between the A47 and South Green flood water backed up behind culverts and found its way onto the road at a low entrance way. It is also noted that there is a large concentration of significant outfalls from positive drainage systems located south of the A47 and north of Middlemarch Road. Properties have also been built in areas prone to natural flooding e.g. the functional flood plain of Dereham Stream.</p>	<p>Norfolk County Council (LLFA) and partners to deliver planned scheme to reduce flood risk in Dereham which includes works to the existing Dereham Stream upstream of this property. Delivery of the scheme is dependant on long term ownership and maintenance agreements being reached.</p> <p>Property owners could also carry out their own Property Flood Resilience measures where residents are unwilling to wait for measures to be approved through national funding schemes.</p> <p>Anglian Water should work with partner organisations to identify the potential for managing the amount or rate of surface water entering their drainage system in flood events. Anglian Water should also identify the impact of water levels in Dereham Stream on their surface water outfalls and the level of constraint this has on their network.</p>	<p>Norfolk County Council (LLFA)</p> <p>Anglian Water</p> <p>Property owners</p>

## Flooding and Flood Risk Within Colkirk



Map showing location of flooding

### Description of Catchment

Colkirk is situated within a small rural catchment draining to the River Wensum

### Flood Incidents Within this Catchment

Within this catchment one incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

Date of Incident	Incident as reported	What was the response to the flood incident
25/09/2020	On the 25/09/2020 - one property was internally flooded on Fairview Drive, Colkirk. This incident was reported by a resident via an online flood report form on the 10 November 2020, (FWF/20/2852)	Norfolk County Council (LLFA) assessed validity and impact of the flood report after the incident.

### Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where there is no available data within this radius this will be stated.

There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

### Historic Flooding Incidents Within the Catchment

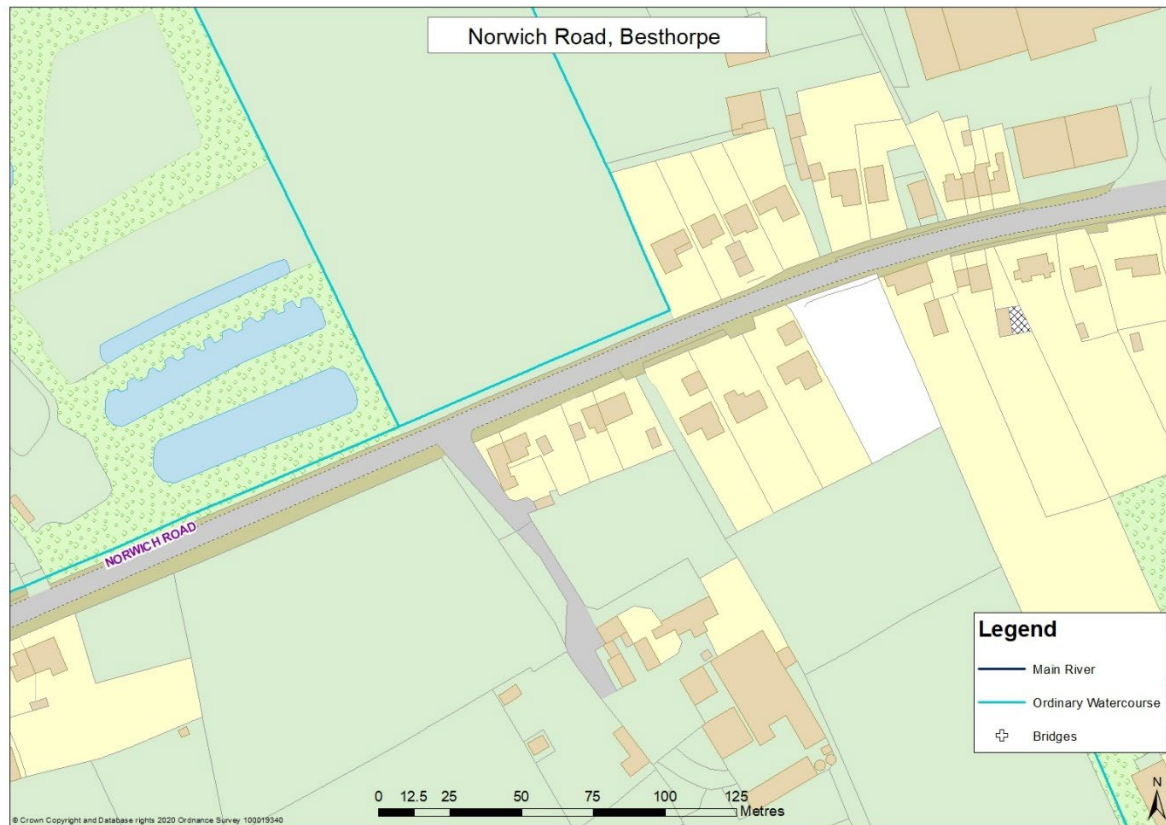
The Lead Local Flood Authority has no previous reports of internal flooding on Fairview Drive, Colkirk.

## Causes of Flooding Within the Catchment and Recommendations

The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Fairview Drive, Colkirk, 25/09/2020	Surface run-off from significant rainfall made its way onto the highway and flowed along the road network and onto the accesses of affected properties that were situated lower than these features.	<p>Norfolk County Council (Highways) will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable.</p> <p>Property owners should protect their buildings through flood protection measures where appropriate.</p> <p>Norfolk County Council (LLFA) will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.</p> <p>Property owners could also carry out their own measures where funding is not forthcoming or residents are unwilling to wait.</p>	<p>Norfolk County Council (Highways and LLFA)</p> <p>Property owners</p>

## Flooding and Flood Risk Within Besthorpe



Map showing location of flooding

### Description of Catchment

Besthorpe is located close to the headwaters of the River Thet. The properties within this report are located next to a tributary of the River Thet in a rural section of the catchment to the north of the A11.

### Flood Incidents Within this Catchment

Within this catchment one incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

<b>Date of Incident</b>	<b>Incident as reported</b>	<b>What was the response to the flood incident</b>
27/08/2020	On the 27/08/2020 - one property was internally flooded on Norwich Road, Besthorpe. This incident was reported by a member of the public via an online flood report form on the 20 September 2020, (FWF/20/2646)	Norfolk County Council (Highways) carried out maintenance work to the highway drainage system after the incident.

### Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where there is no available data within this radius this will be stated.

There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

### Historic Flooding Incidents Within the Catchment

<b>Date of incident</b>	<b>Impact</b>	<b>Rainfall intensity</b>
2014	Flooding on Norwich Road	Not known
2018	Flooding to various properties on Norwich Road	Not known
2019	Flooding to various properties on Norwich Road	Not known

## Causes of Flooding Within the Catchment and Recommendations

The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

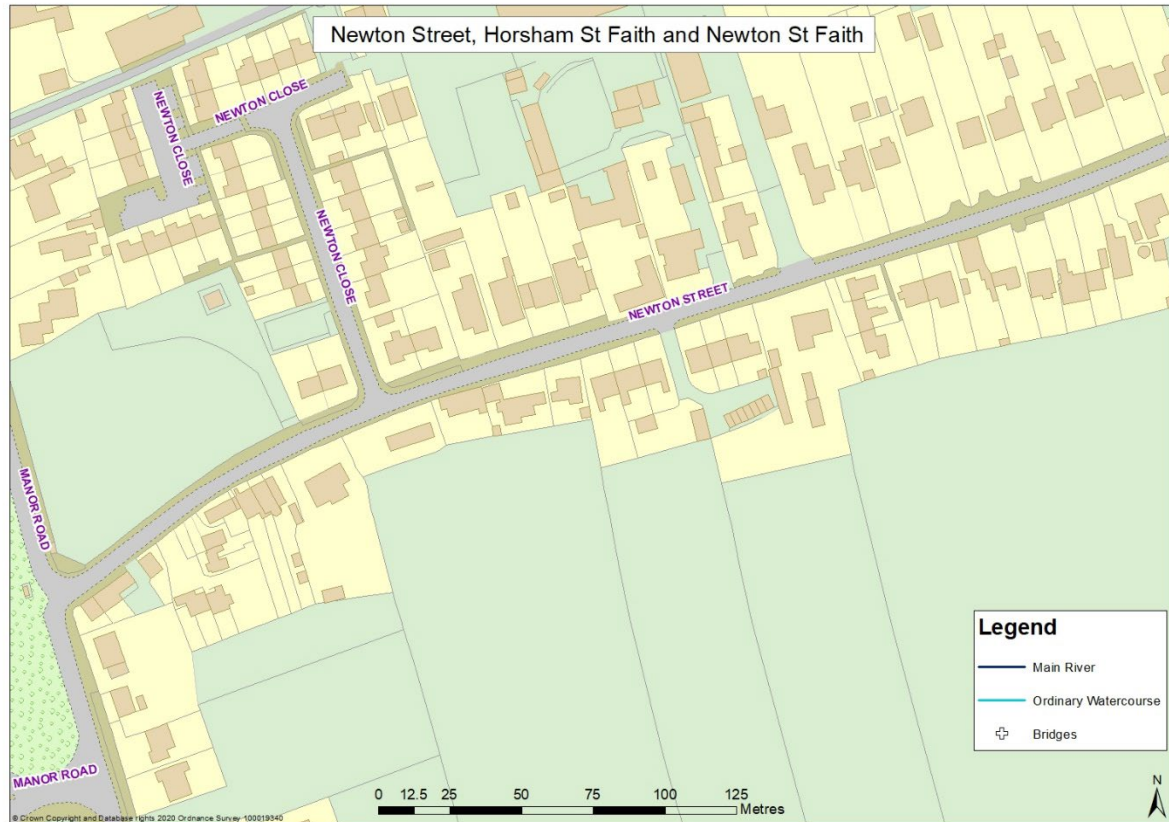
<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Norwich Road, Besthorpe, 27/08/2020	Run-off from significant rainfall pooled at a low point within the catchment affecting property.	Norfolk County Council (LLFA) will investigate with third parties the potential to fund small scale improvement schemes to mitigate the risk experienced at this location. This could be either through the submission of a bid to secure Partnership funding or through negotiation with other organisations and the local community. It is important to note this recommendation will be subject to the priorities and availability of resources of funders. It may be dependent on those property owners affected contributing towards a solution.	Norfolk County Council (LLFA)
Norwich Road, Besthorpe, 27/08/2020	Surface run-off from significant rainfall made its way onto the highway and flowed along the road network and onto the accesses of affected properties that were situated lower than these features.	Norfolk County Council (Highways) will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable.	Norfolk County Council (Highways)



Location and date of flooding	Causes of flooding	Recommendation	Risk Management Authority/ Individual with Relevant Flood Risk Roles
Norwich Road, Besthorpe, 27/08/2020	Run-off from significant rainfall was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded. This directed flood water towards the affected property. This was due to the infiltration of surface water into existing drainage networks.	Norfolk County Council (Highways) should work with partner organisations to identify the potential for managing the amount or rate of surface water entering their drainage system in flood events.	Norfolk County Council (Highways)

# Broadland District Council Area

## Flooding and Flood Risk Within Horsham St Faith and Newton St Faith



Map showing location of flooding

### Description of Catchment

The properties within this section fall within the catchment of Stone Beck, which converges with Dobbs Beck prior to joining the River Bure. The catchment is predominantly rural.

### Flood Incidents Within this Catchment

Within this catchment one incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

<b>Date of Incident</b>	<b>Incident as reported</b>	<b>What was the response to the flood incident</b>
25/09/2020	<p>On the 25/09/2020 - one property was internally flooded on Newton Street, Horsham St Faith and Newton St Faith.</p> <p>This incident was reported by Norfolk County Council (Highways) via an electronic report on the 29 September 2020, (FWF/20/2704)</p>	<p>Norfolk County Council (LLFA) assessed validity and impact of the flood report after the incident.</p>

### Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where there is no available data within this radius this will be stated.

There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

### Historic Flooding Incidents Within the Catchment

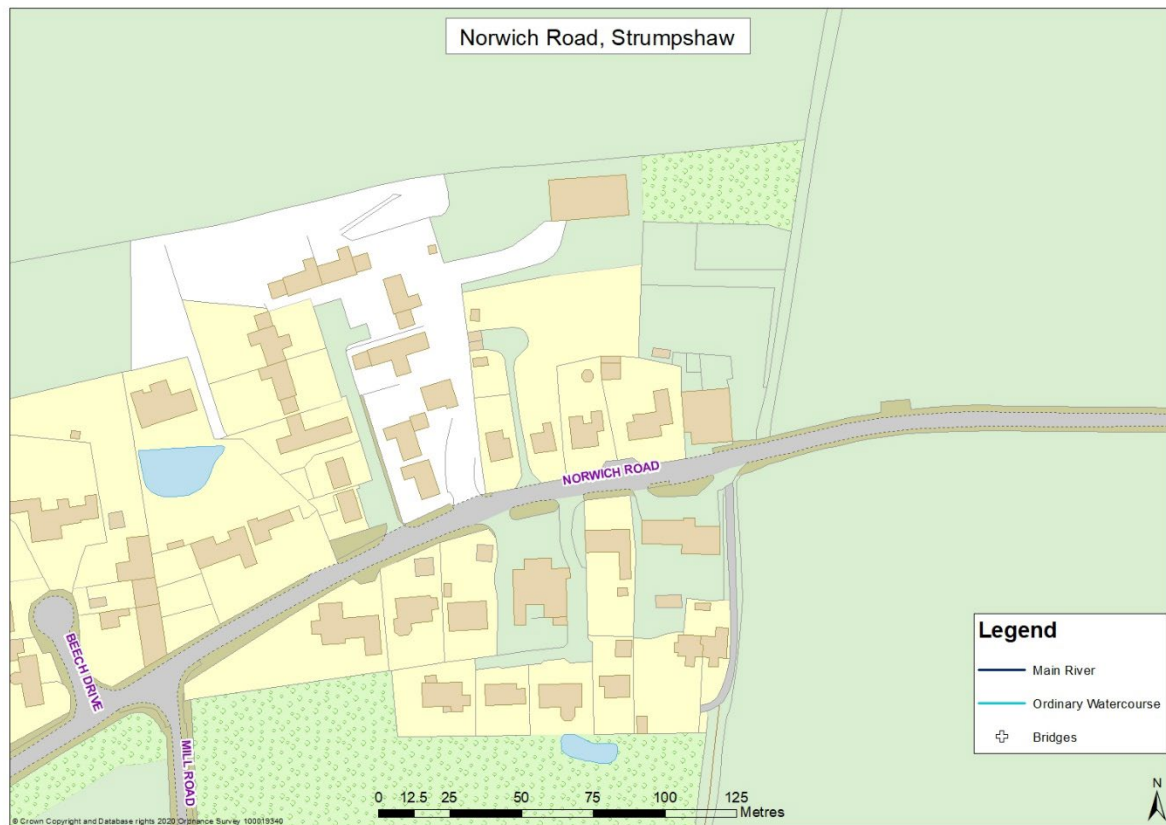
The Lead Local Flood Authority has no previous reports of internal flooding on Newton Street, Horsham St Faith and Newton St Faith.

### Causes of Flooding Within the Catchment and Recommendations

The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

Location and date of flooding	Causes of flooding	Recommendation	Risk Management Authority/ Individual with Relevant Flood Risk Roles
<p>Newton Street, Horsham St Faith and Newton St Faith, 25/09/2020</p>	<p>Run-off from rainfall was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded. This directed flood water towards the affected property. Surface run-off from rainfall made its way onto the highway and flowed along the road network and onto the accesses of the affected property.</p>	<p>Norfolk County Council (Highways) will review the capacity and level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified. Norfolk County Council should assess whether the capacity of the current system is able to provide protection that aligns with British standards.</p> <p>Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council (LLFA) will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. Property owners could also carry out their own measures where funding is not forthcoming or residents are unwilling to wait.</p>	<p>Norfolk County Council (Highways and LLFA)</p> <p>Property Owners</p>

## Flooding and Flood Risk Within Strumpshaw



Map showing location of flooding

### Description of Catchment

Strumpshaw is located at the upstream end of a small rural catchment. There is a surface water flow path through the village drains north to a tributary of the Lackford Run which in turn drains to the River Yare.

### Flood Incidents Within this Catchment

Within this catchment one incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

Date of Incident	Incident as reported	What was the response to the flood incident
25/09/2020	On the 25/09/2020 - one property was internally flooded on Norwich Road, Strumpshaw. This incident was reported by a resident via an online flood report form on the 29 September 2020, (FWF/20/2693)	Norfolk County Council (LLFA) assessed validity and impact of the flood report after the incident.

## Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where there is no available data within this radius this will be stated.

There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

## Historic Flooding Incidents Within the Catchment

<b>Date of incident</b>	<b>Impact</b>	<b>Rainfall intensity</b>
2012	Flooding on Norwich Road	Not known
2013	Flooding on Norwich Road	Not known
2014	Flooding on Norwich Road	Not known
2016	Flooding on Norwich Road	Not known
2017	Flooding on Norwich Road	Not known
2019	Flooding on Norwich Road	Not known

## Causes of Flooding Within the Catchment and Recommendations

The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

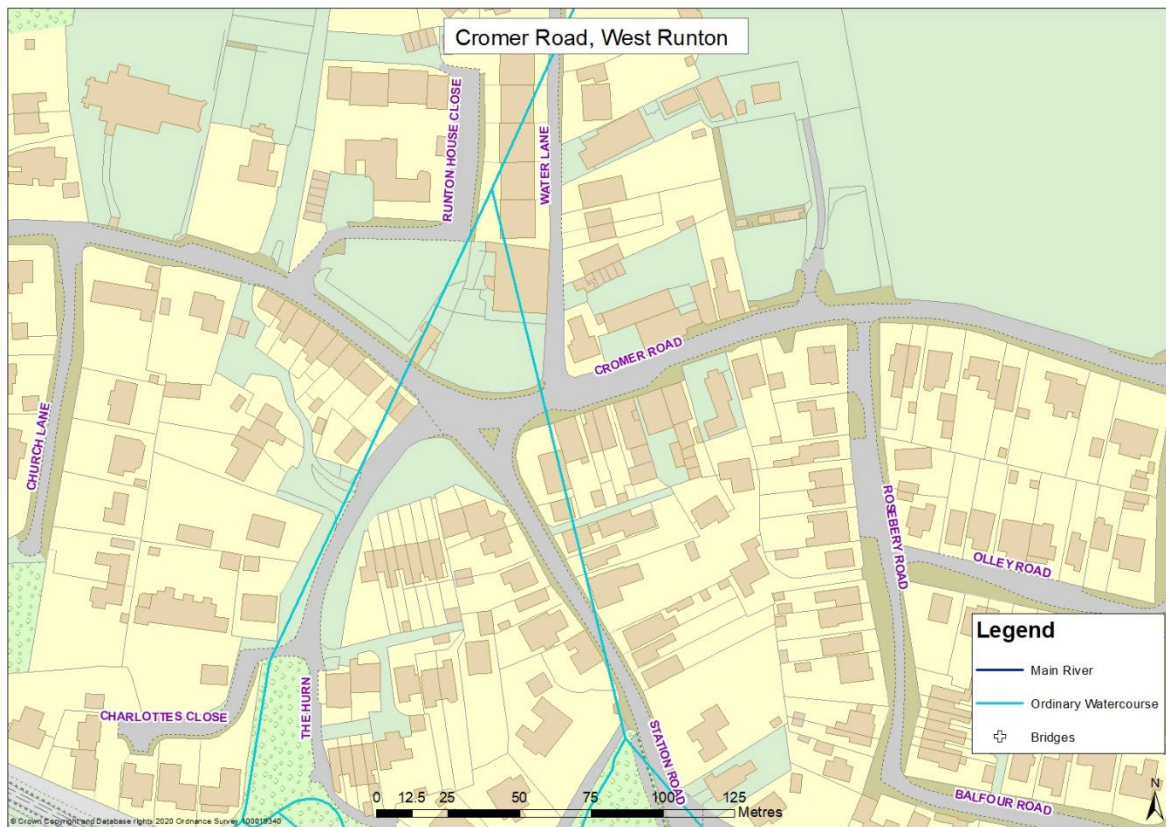
Location and date of flooding	Causes of flooding	Recommendation	Risk Management Authority/ Individual with Relevant Flood Risk Roles
<p>Norwich Road, Strumpshaw, 25/09/2020</p>	<p>Rainfall was concentrated on the highway throughout the catchment. Vehicles using the highway passed through the floodwater causing it to wash towards the affected property</p> <p>Run-off from rainfall was directed towards the surface water drainage network. These flows could not be accommodated as the system and was already overloaded due to obstruction in the system by debris, and this directed flood water towards the affected property.</p> <p>The loss of pre-existing drainage features (a pond on an adjacent field) within the catchment exacerbated the flooding.</p>	<p>Norfolk County Council (Highways) will install an infiltration basin adjacent to Norwich Road if third party land can be secured. Norfolk County Council (Highways) have completed ditching work on the roadside to hold water off the road.</p>	<p>Norfolk County Council (Highways)</p>



<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Norwich Road, Strumpshaw, 25/09/2020	Due to overloaded surface water system, rainfall was directed into the foul system across the catchment, causing it to surcharge elsewhere. This surcharging contributed to the flooding at the affected property.	Anglian Water has installed real time telemetry on the pumping station, and sealed foul lids in the area. This will allow pump operation to be adjusted to balance out flows across the whole network in a holistic way so as not to put pressure on specific areas, which has been tested.	Anglian Water
Norwich Road, Strumpshaw, 25/09/2020	Run-off from rainfall pooled at a low point within the catchment affecting properties.	Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council (LLFA) will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. Property owners could also carry out their own measures where funding is not forthcoming or residents are unwilling to wait.	Property Owners  Norfolk County Council (LLFA)

# North Norfolk District Council Area

## Flooding and Flood Risk Within West Runton



Map showing location of flooding

### Description of Catchment

West Runton falls within a small coastal catchment. The upstream catchment is forested and the downstream section of the catchment is urbanised.

### Flood Incidents Within this Catchment

Within this catchment one incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

Date of Incident	Incident as reported	What was the response to the flood incident
25/09/2020	On the 25/09/2020 - one property was internally flooded on Cromer Road, West Runton. This incident was reported by a resident via an online flood report form on the 25 September 2020, (FWF/20/2676)	Norfolk County Council (LLFA) assessed validity and impact of the flood report after the incident.

### Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where there is no available data within this radius this will be stated.

There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

### Historic Flooding Incidents Within the Catchment

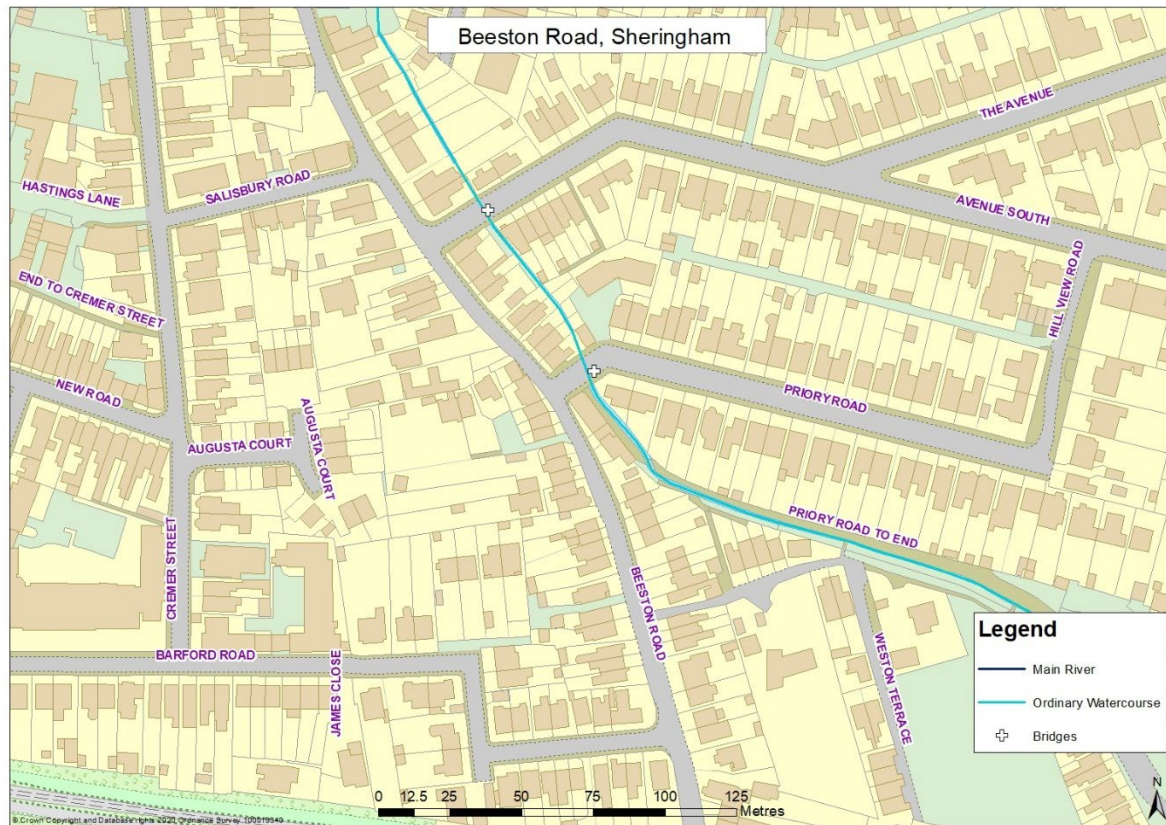
The Lead Local Flood Authority has no previous reports of internal flooding on Cromer Road, West Runton.

## Causes of Flooding Within the Catchment and Recommendations

The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Cromer Road, West Runton, 25/09/2020	Surface run-off from rainfall made its way from the downhill slope and onto the accesses of affected properties that were situated lower than these features.	Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council (LLFA) will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. Property owners could also carry out their own measures where funding is not forthcoming or residents are unwilling to wait. Property Owners should consider the potential to retrofit permeable areas and other methods of small scale sustainable drainage systems.	Norfolk County Council (LLFA)  Property owners

## Flooding and Flood Risk Within Sheringham



Map showing location of flooding

### Description of Catchment

The properties within Sheringham are located within the catchment of the Beeston Beck, a small, urbanised catchment. The Beck is modified through Sheringham with several culverts passing underneath roads.

### Flood Incidents Within this Catchment

Within this catchment one incident of internal flooding has been assessed as part of this investigation. These incidents are detailed in the table below.

Date of Incident	Incident as reported	What was the response to the flood incident
17/08/2020	On the 17/08/2020 one property was internally flooded on Beeston Road, Sheringham. This incident was reported by a member of the public via an online flood report form on 4 January 2021, (FWF/21/3606)	Norfolk County Council (LLFA) assessed validity and impact of the flood report after the incident.

## Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where there is no available data within this radius this will be stated.

There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

## Historic Flooding Incidents Within the Catchment

<b>Date of incident</b>	<b>Impact</b>	<b>Rainfall intensity</b>
2012	Flooding on Beeston Road	Not known
2019	External flooding on Beeston Road	Not known

## Causes of Flooding Within the Catchment and Recommendations

The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

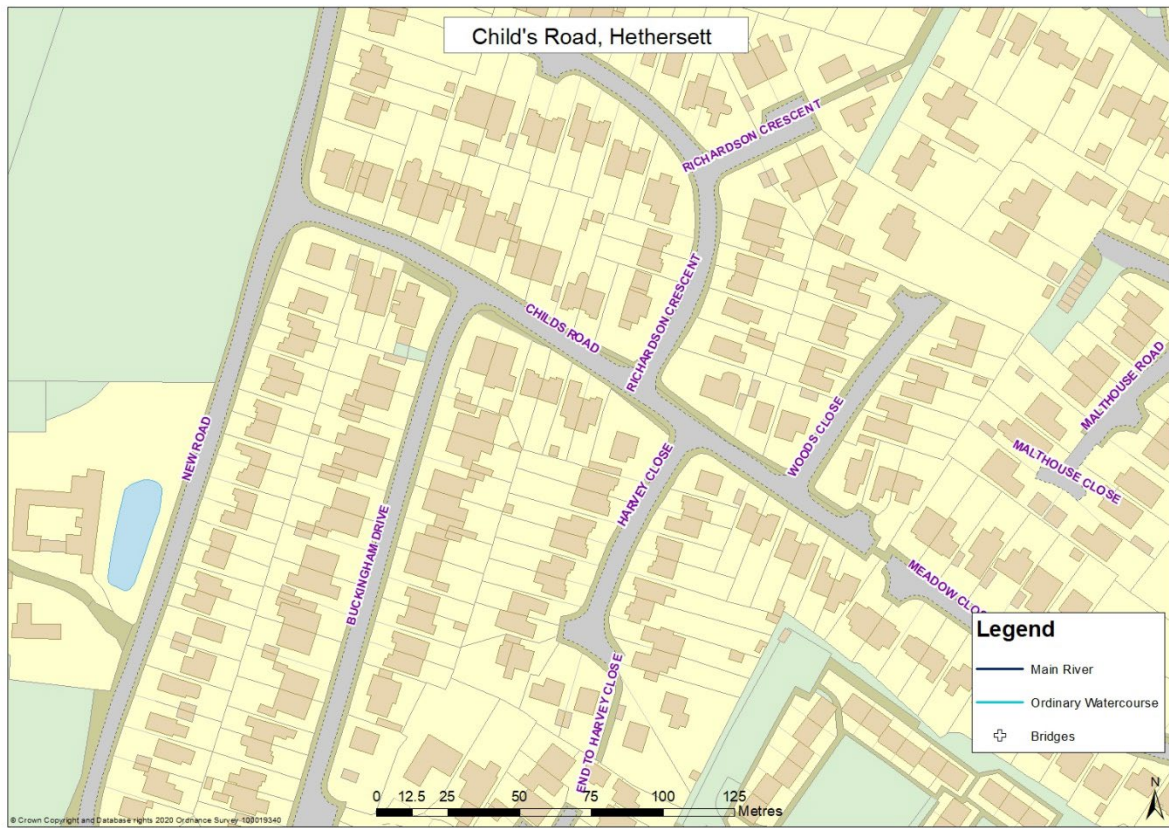
<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Beeston Road, Sheringham, 17/08/2020	Run-off from significant rainfall was directed towards the watercourse and through structures situated on it. These flows could not be accommodated as the watercourse was already overloaded. This directed flood water towards the affected property.	Norfolk County Council (Highways) has undertaken ground repair works to reduce impact of flooding  Anglian Water should review the capacity and level of maintenance required to sustain the design efficiency of their drainage systems (The Beeston Beck) in line with the risk identified. Anglian Water should assess whether the capacity of the current system is impacting flood risk. This may require a survey of the system to be undertaken. Riparian Owners should maintain the banks of the Beeston Beck.	Norfolk County Council (Highways)  Anglian Water  Riparian Owners

<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Beeston Road, Sheringham, 17/08/2020	The flood water entered the property through low thresholds at entrances and air bricks.	Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council (LLFA) will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. Property owners could also carry out their own measures where funding is not forthcoming, or residents are unwilling to wait.	Norfolk County Council (LLFA)  Property Owners



# South Norfolk District Council Area

## Flooding and Flood Risk Within Hethersett



Map showing location of flooding

### Description of Catchment

The property in Hethersett within this report is located close to the upstream boundary of the catchment of an un-named watercourse that runs to the west of the village. The properties sit within an urbanised section of the wider, predominantly rural catchment.

### Flood Incidents Within this Catchment

Within this catchment one incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

Date of Incident	Incident as reported	What was the response to the flood incident
28/09/2020	On the 28/09/2020 - one property was internally flooded on Childs Road, Hethersett. This incident was reported by a member of the public via email correspondence on the 15 November 2020, (FWF/20/2839)	Norfolk County Council (LLFA) visited affected residents to offer advice and to gather information after the incident.

### Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where there is no available data within this radius this will be stated.

One incident (100%) of internal flooding in this catchment is within 2.5km of a rain gauge.

Data from rain gauges located in Hethersett have been analysed to ascertain the intensity of the rainfall events experienced in the catchment.

The rainfall events recorded by gauges for this catchment are:

On 25 September 2020, 46.4 mm of rainfall was recorded as falling in 11 hours at the Hethersett Water Tower rainfall monitoring station. This intensity of rainfall for the total duration equates to a 1 in 10 (10% AEP) rainfall event.

### Historic Flooding Incidents Within the Catchment

The Lead Local Flood Authority has no previous reports of internal flooding on Childs Road, Hethersett.

## Causes of Flooding Within the Catchment and Recommendations

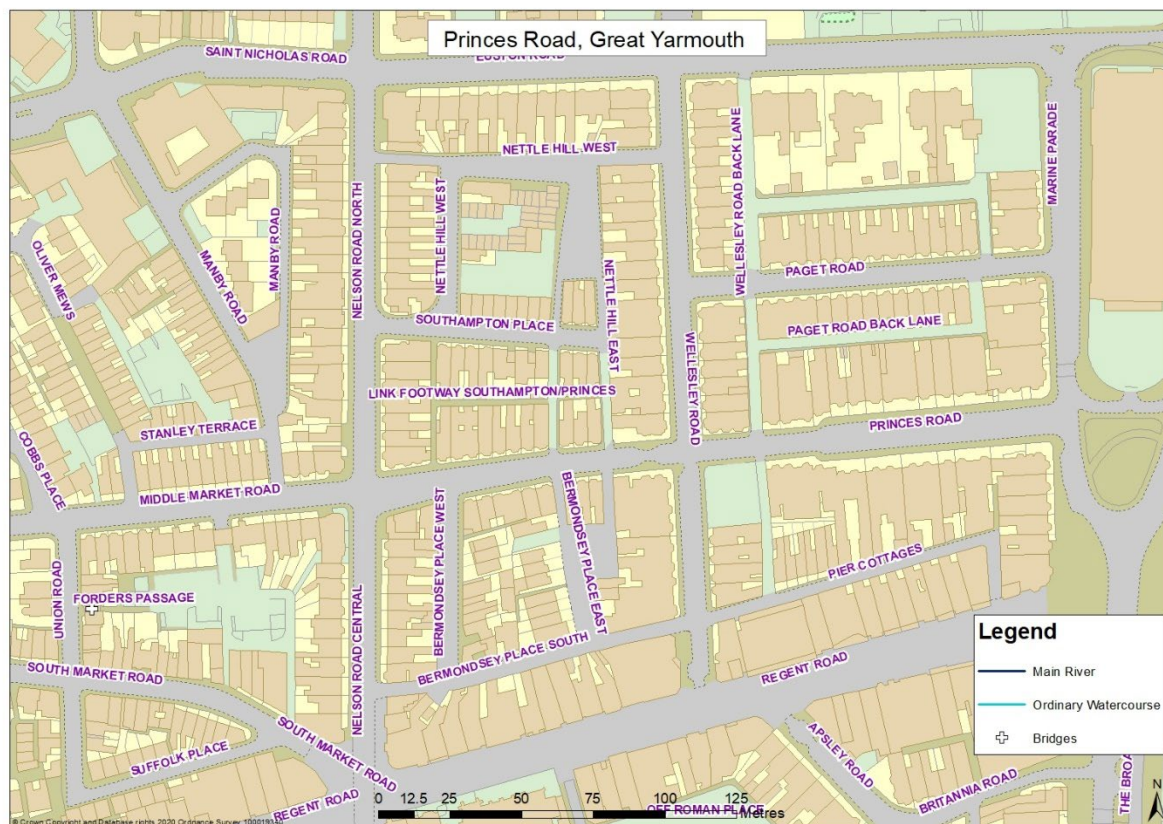
The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Childs Road, Hethersett, 28/09/2020	Run-off from significant rainfall was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded. This directed flood water towards the affected property.	<p>Norfolk County Council (Highways) should work with partner organisations (including Anglian Water) to identify the potential for managing the amount or rate of surface water entering their drainage system in flood events.</p> <p>Anglian Water should review the capacity and level of maintenance required to sustain the design efficiency of their drainage systems in line with the risk identified. Anglian Water should assess whether the capacity of the current system is able to provide protection that aligns with British standards. This may require a survey of the system to be undertaken.</p>	<p>Norfolk County Council (Highways)</p> <p>Anglian Water</p>
Childs Road, Hethersett, 28/09/2020	Water was directed from a neighbouring property by their patio or access drive towards the affected property.	Amendments should be made to neighbouring properties to ensure water is not directed to other properties	Property Owners

<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Childs Road, Hethersett, 28/09/2020	Run-off from significant rainfall pooled at a low point within the catchment affecting property.	Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council (LLFA) will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. Property owners could also carry out their own measures where funding is not forthcoming, or residents are unwilling to wait.	Norfolk County Council (LLFA)  Property Owners

# Great Yarmouth Borough Council Area

## Flooding and Flood Risk within Great Yarmouth



Map showing location of flooding

### Description of Catchment

The properties within this section are located within a small urbanised coastal catchment to the east of the River Yare. This area is within the Northgate Critical drainage area, identified within the Great Yarmouth Borough Surface Water Management Plan.

### Flood Incidents Within this Catchment

Within this catchment one incident of internal flooding has been assessed as part of this investigation. These incidents are detailed in the table below.

Date of Incident	Incident as reported	What was the response to the flood incident
20/08/2020	On the 20/08/2020 - one property was internally flooded on Princes Road, Great Yarmouth. This incident was reported by a resident via a flood questionnaire on the 9 September 2020, (FWF/20/2622)	Anglian Water visited affected residents to offer advice and to gather information after the incident. Norfolk County Council (Highways) visited affected residents to offer advice and to gather information after the incident.

### Recent Rainfall Within the Catchment

This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced in the catchment that led to the flooding. This analysis is useful in assessing (in broad terms) if the design capacity of drainage systems within the affected areas was exceeded.

Norfolk County Council (LLFA) has sought to use data from rain gauges where incidents of flooding are located within a 2.5 km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where there is no available data within this radius this will be stated.

There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

### Historic Flooding Incidents Within the Catchment

The Lead Local Flood Authority has no previous reports of internal flooding on Princes Road, Great Yarmouth.

### Causes of Flooding Within the Catchment and Recommendations

The findings of the investigation are detailed on the following pages. The table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding and recommendations for these Risk Management Authorities.

<b>Location and date of flooding</b>	<b>Causes of flooding</b>	<b>Recommendation</b>	<b>Risk Management Authority/ Individual with Relevant Flood Risk Roles</b>
Princes Road, Great Yarmouth, 20/08/2020	Surface run-off from significant rainfall made its way onto the highway and flowed along the road network and onto the accesses of affected properties that were situated lower than these features.	Norfolk County Council (Highways) will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable.	Norfolk County Council (Highways)

Location and date of flooding	Causes of flooding	Recommendation	Risk Management Authority/ Individual with Relevant Flood Risk Roles
Princes Road, Great Yarmouth, 20/08/2020	<p>The surface water drainage system was partially obstructed by debris or silt. This reduced the efficiency of the upstream drainage system contributing to flooding at the affected properties.</p> <p>Run-off from significant rainfall was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded. This directed flood water towards the affected property. This was due to the infiltration of surface water into existing drainage networks.</p>	<p>Anglian Water and Norfolk County Council (Highways) will review the capacity and level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified. Norfolk County Council (Highways) should assess whether the capacity of the current system is able to provide protection that aligns with British standards. This may require a survey of the system to be undertaken.</p> <p>The property owner should check their private drainage in order to ascertain any problems with its functionality and carry out maintenance where necessary.</p>	<p>Anglian Water</p> <p>Norfolk County Council (Highways)</p> <p>Property Owners</p>
Princes Road, Great Yarmouth, 20/08/2020	Significant rainfall was directed into the surface water system causing it to surcharge elsewhere. This surcharging contributed to the flooding at the affected property.	Anglian Water and Norfolk County Council (Highways) should work with partner organisations to identify the potential for managing the amount or rate of surface water entering their drainage system in flood events.	Anglian Water Norfolk County Council (Highways)



Location and date of flooding	Causes of flooding	Recommendation	Risk Management Authority/ Individual with Relevant Flood Risk Roles
Princes Road, Great Yarmouth, 20/08/2020	The flood water entered the property via the cellar.	Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council (LLFA) will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. Property owners could also carry out their own measures where funding is not forthcoming or residents are unwilling to wait.	Norfolk County Council (LLFA)  Property Owners

## **Disclaimer**

Although every effort has been taken to ensure the accuracy of the information contained within the pages of the report, it cannot be guaranteed that the contents will always be current, accurate or complete.

This report has been prepared as part of Norfolk County Council's responsibilities under 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 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.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Norfolk 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.

Norfolk 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 Norfolk 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 or 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 the County Council highlighting flooding to properties at a street level.

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## Appendix A - Key Definitions and Responsibilities

### What is Flooding?

Section 1 of the Flood and Water Management Act 2010 states that: 'Flood' includes any case where land not normally covered by water becomes covered by water. In addition, this section adds the caveat:

*"But 'flood' does not include –*

- (a) a flood from any part of the sewerage system, unless wholly or partly caused by an increase in the volume of rainwater (including snow and other precipitation) entering or otherwise affecting the system, or*
- (b) a flood caused by a burst water main (within the meaning given by Section 219 of the Water Industry Act 1991)."*

### What is Internal and External Flooding?

For the purposes of this report, properties that have internally flooded are those where it is considered that water has entered the fabric of the building, where:

- a) Basements and below ground level floors are included.
- b) Garages are included if in the fabric of the building. Garages adjacent or separate from the main building are not included.
- c) Occupied caravans are included but not tents.

External flooding included those properties where water has entered gardens or surrounding areas which restricts access, affects the highway or where flooding has disrupted essential services to the property such as sewerage. For businesses this includes those where the flood waters are directly preventing them trading as usual.

### What is Local Flood Risk?

Local Flood Risk is defined by the Flood and Water Management Act 2010 as being flood risk from surface run-off, groundwater, and ordinary watercourses; where,

- a) 'Surface run-off' means rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving) and, has not entered a watercourse, drainage system or public sewer.
- b) 'Groundwater' means all water which is below the surface of the ground and in direct contact with the ground or subsoil.
- c) 'Ordinary Watercourse' means a watercourse that does not form part of a main river and includes a reference to a lake, pond or other area of water which flows into an ordinary watercourse.

### What is a Catchment?

To aid the investigation process and, for ease of presentation, the incidents of flooding have been grouped within this document based on hydrological catchments.

The purpose of viewing flooding incidents based on catchments reflects the reality that flooding does not respect the administrative boundaries of water management organisations. Hydrological catchments catch water and discharge it at locations known as outlets. Individual hydrological catchment boundaries are usually formed by ridges of surrounding higher ground, which separate the lower lying areas at a line known as a watershed.

## Roles and Responsibilities of Risk Management Authorities

Below is a short summary of those groups and Risk Management Authorities (RMAs) that have a role in managing flooding within Norfolk. The listing of responsibilities includes those duties or powers that directly relate to managing the flood incidents or consequence. All RMAs have a duty to cooperate with other RMAs.

### 1. Norfolk County Council (as Lead Local Flood Authority)

- a) Duty to investigate significant flooding from any source.
- b) Duty to maintain a register of structures or features which affect flood risk from all sources.
- c) Power to undertake works to manage flood risk from surface run-off and groundwater.
- d) Powers to regulate activities on ordinary watercourses outside of Internal Drainage Board areas.
- e) Duties as a Category 1 Responder for Emergency Planning and the Fire and Rescue Service.

### 2. District, City and Bough Councils

- a) Powers to undertake works on ordinary watercourses outside of IDB areas.
- b) The Local Planning Authority for their District area and determine the appropriateness of developments and their exposure and effect on flood risk.
- c) Duties as a Category 1 Responder for Emergency Planning.

### 3. Internal Drainage Boards (IDBs)

- a) A duty to act in a manner consistent with the national and local strategies and guidance when exercising FCERM functions.
- b) Duty to act in a manner consistent with Local Flood Risk Management Strategies when exercising other functions that may affect flood risk.
- c) Powers to regulate activities on ordinary watercourses within IDB areas.
- d) Exercise a general power of supervision over all matters relating to the drainage of land within their district.
- e) Powers to undertake works on ordinary watercourses within IDB areas.

### 4. Highway Authorities (Norfolk County Council / Highways England)

- a) Powers to undertake works to manage water on the highway and to move water off the highway.
- b) Enforcement powers to unauthorised alterations, obstructions, and interferences with highway drainage.

- c) Have responsibilities for culverts vested in the highway. Currently NCC discharges its responsibilities associated with bridges and culverts (whether as owner or highway authority) through the inspection of condition (undertaken by the Bridges team) and through maintenance activity (delivered on a as needs basis by the relevant Highways area team).

#### 5. Water Companies

- a) Undertake cost beneficial capital schemes to alleviate or eliminate flooding where the flood event is associated with a failure of their assets.
- b) Duty to provide, improve, maintain, and operate systems of public sewers and works for the purpose of effectually draining an area.
- c) Are responsible for flooding from their foul, combined and surface water sewers, and from burst water mains.
- d) Maintain 'At Risk Registers' for Ofwat that record properties that have flooded from public foul, combined and surface water sewers and that are at risk of flooding again.
- e) Water companies respond to reports from the public of flooding associated with their assets and determine an appropriate response in line with their standards or customer service.
- f) Duties as a Category 2 Responder for Emergency Planning.

#### 6. Riparian Owners

- a) Duty of care towards neighbours upstream and downstream, avoiding any action likely to cause flooding.
- b) Entitled to protect their properties from flooding.
- c) May be required to maintain the condition of their watercourse to ensure that the proper flow of water is unimpeded.

#### 7. Environment Agency

- a) Powers to regulate Activities on Main Rivers.
- b) Permissive powers to undertake maintenance, however responsibility rests with riparian owners, any maintenance done under Environment Agency permissive powers is done on a risk based approach within the funding available.
- c) Power to undertake works to manage flood risk from main rivers.
- d) Required to have a strategic overview of all forms of flooding.
- e) Enforcement powers for reservoirs greater than 25,000m<sup>3</sup> and a duty to maintain a register of these reservoirs.
- f) Duties as a Category 1 Responder for Emergency Planning (including issuing flood warnings).