



Norfolk County Council

Investigation Report into the flooding County Wide on the 16th August 2020

Report Reference: FIR/061

Draft Report prepared by Abygail Hadley, Nathalie Harris, Nathan Harris, Mark Henderson and Mark Ogden on 13th November 2020.

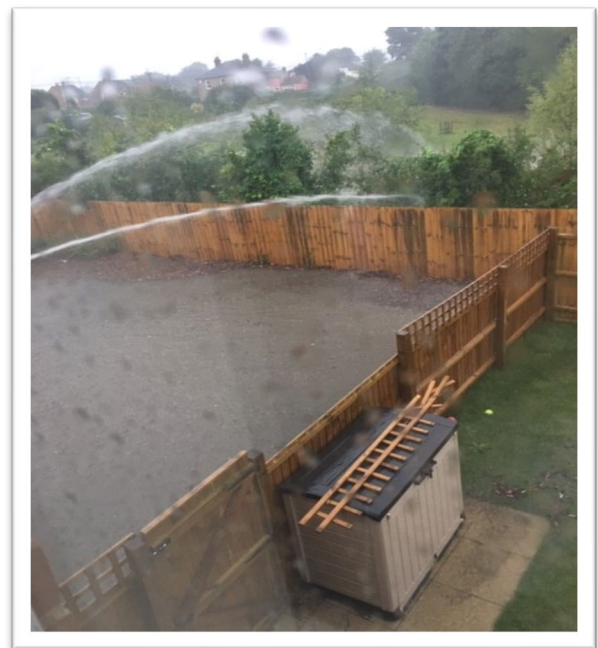


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Introduction

Flooding occurred across Norfolk on the 16th August 2020. Norfolk County Council has confirmed 58 incidences of internal flooding on this date which are covered in this report. However, it is suspected that the event is highly under-reported. This assumption is based on information from the public who informed us that their neighbours and local area had been flooded. Norfolk County Council has tried to contact these residents but has not received a response. Any subsequent reports received for this date will be investigated and published in an additional report.

East Anglia received an above normal amount of rainfall throughout August with an average total of 78mm of rainfall, 148% of the Long-Term Average. On the 16th August rainfall was concentrated on two main areas, the Breckland District and Sheringham. The Watton Rainfall Station recorded 148.6mm of rainfall in 6 hours and 30 minutes, there is a 0.03% chance of a storm this size occurring in any given year. The intensity of this storm caused flash flooding in many areas.

For the purpose of this report and ease of presentation we have divided the by district, then catchment. In most cases a catchment map has been generated to show the proximity of the properties to overland flow paths, however, in areas of isolated flooding where the flooding does not relate to a flow path a catchment map has not been generated.

For the purpose of this report and ease of presentation, we have divided the report by district, then catchment, then settlement.

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;

- (a) There is ambiguity surrounding the source or responsibility for a flood incident, and/or;
- (b) 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;

- Any risk to loss of life or serious injury.
- One or more residential or business property flooded internally.
- 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.
- 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.
- Flooding adversely impacting a rail link by making it impassable.

It was deemed necessary to complete a formal Investigation Report into the flooding in County Wide in 16th August as:

- multiple residential properties were internally flooded.

This impact met Norfolk County Council's threshold for triggering the undertaking of a formal flood investigation.

The flood investigation report aims to:

- provide a transparent and consistent review of recent flooding.
- identify those organisations and individuals who have responsibility to manage the causes of the flooding.
- identify what their response has been or will be to the flooding.
- make recommendations as to how the flood risk could be mitigated or reduced.
- 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.

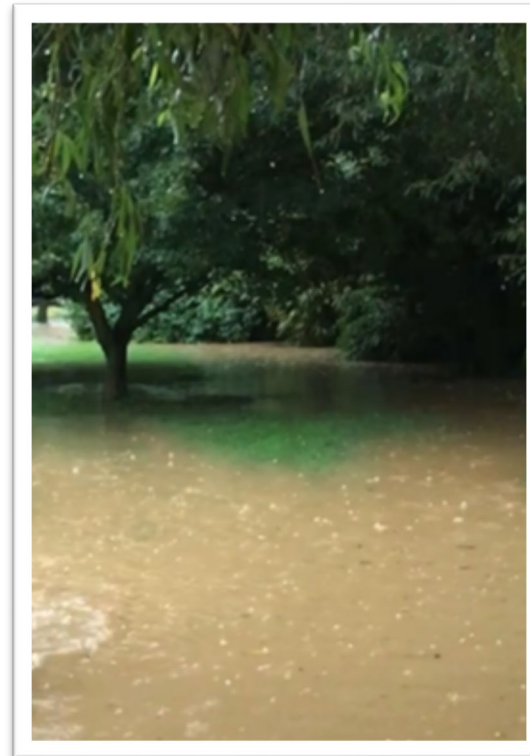
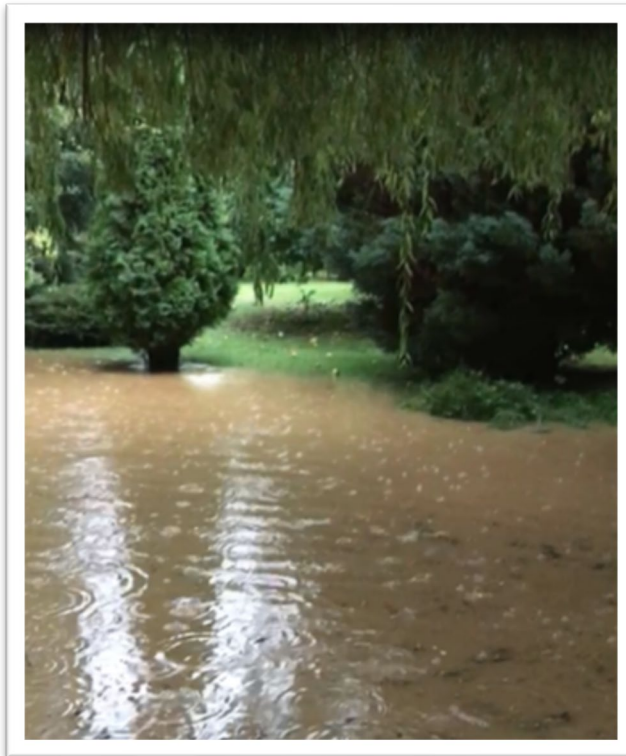
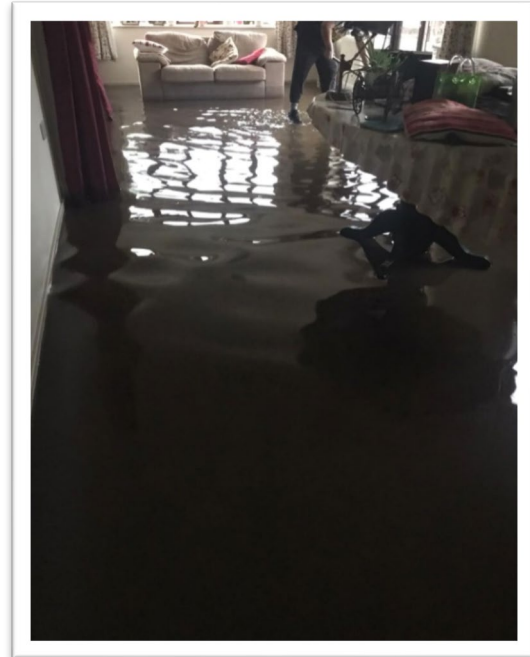
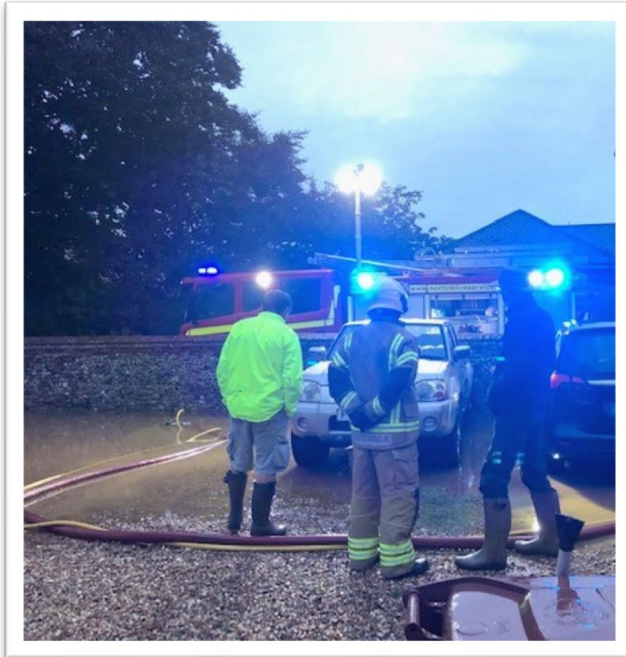
The flood investigation report cannot:

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



Norfolk County Council

Investigation Report into the flooding in Breckland on the 16th August 2020



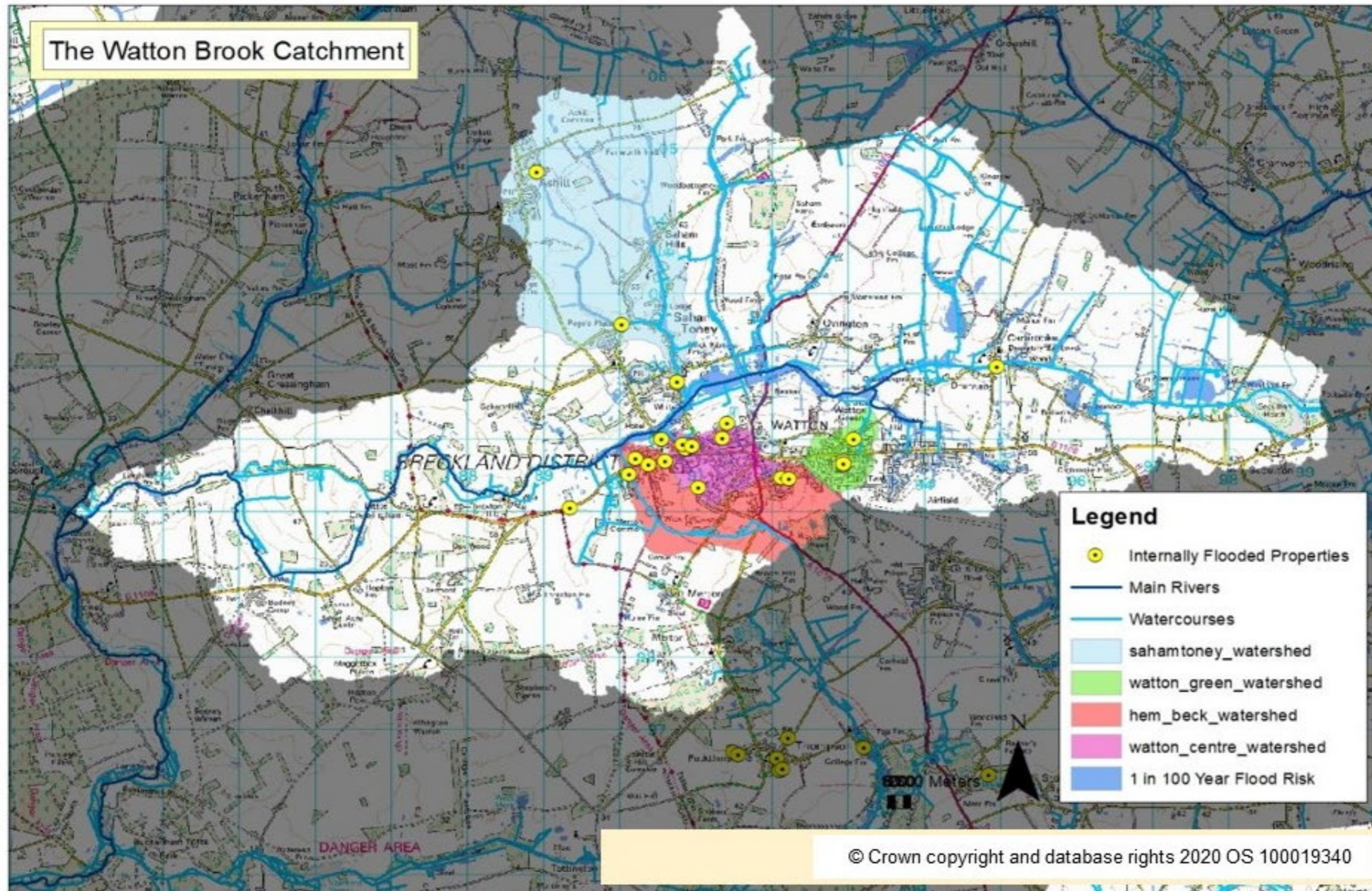
Summary

The district of Breckland was hit the hardest by flooding in Norfolk on the 16th August 2020 with 47 properties internally flooded. These properties were spread across a number of locations and catchments which are summarised in the table below.

Location	Catchment	Number of affected properties	Page number
Saham Toney	Watton Brook	3	14
Ashill	Watton Brook	1	48
Watton	Watton Brook	18	8
Little Cressingham	Watton Brook	2	42
Carbrooke	Watton Brook	1	44
Thompson	Stanford	8	51
Great Hockham	Stonebridge	1	64
Wretham	Stonebridge	1	64
Litcham	No catchment generated	1	72
Harling (Dolphin Terrace)	Roudham	3	76
Swaffham	Gadder	3	81
Harling (The Glebe)	East Harling	3	88
Thetford	No catchment generated	1	93
Necton	Necton South	1	97

Flooding and flood risk within the Watton Brook catchment

Map 1



This map shows the Watton Brook Catchment. Sub-catchments where there are multiple flooded properties have also been highlighted to show the proximity of properties to one another, and the location of the properties in relation to flow paths. These sub-catchments can be seen in greater detail on the following pages.

Description of catchment

Watton Brook is a large catchment that includes the market town of Watton as well as the surrounding villages of Carbrooke to the East, Saham Toney, Ovington and Ashill to the North and Merton to the south. The central Watton area is broken into several smaller sub catchments; South Moor, Watton Green, Hembeck and Watton Centre.

Flood incidents within this catchment

The flooding in the Watton Brook Catchment was concentrated in the west of Watton, but properties were also affected in Saham Toney and Ashill. The rain gauge at Watton Brook recorded 146.8mm of rainfall falling over a 6.5 hour period, there is a 0.1% of a storm of this size occurring at this location in any given year. 22 properties were affected across this area and the locations can be seen below.

Saham Toney

Cley Lane – 2 properties

Pages Lane – 1 property

Watton

Glebe Road – 1 property

Horseshoe Close – 2 properties

Lovell Gardens – 5 properties

Swaffham Road – 2 properties

Jubilee Road – 1 property

Nelson Court – 1 property

Sharman Avenue – 1 property

Priory Road – 1 property

Brandon Road – 2 properties

Pingo Road – 1 property

Langmere Road – 1 property

Little Cressingham

Brandon Road – 2 properties

Carbrooke

Bridge Street – 1 property

Ashill

The Green – 1 property

Key causes of flooding within this catchment

More detail on the causes that occurred within the catchment can be found in each section of this report however some of the key trends identified in the flooding of 2020 have been summarised on below;

- The rainfall experienced on 16 August 2020 was recorded to the West of Watton at the Watton STW station as being over a 1:1000 year storm.
- A large number of the properties impacted are situated on an overland flow paths and/or are below the level of the nearest highway.
- The capacity of surface water drainage including land drains, highway drainage and private property drainage was exceeded due to the significant levels of rainfall that fell during the event.
- The capacity of the foul network was also exceeded due to the ingress of surface water into the foul network. This caused the foul network to surcharge in a number of locations during the event with several residents reporting foul water entering their property.
- The flooding in several locations was exacerbated by the loss of drainage features including ditches and pond.
- Features such as kerbs, walls, garden fences and alleyways had the effect of containing or channelling flood water near to properties.
- In some locations the water on the public highway was pushed towards properties by passing vehicles.
- Flood water entered properties through the unprotected structure of the building. This included via features low thresholds at entrances, unprotected air bricks and services conduits.

Key recommendations

The recommendations set out in the report have been summarised below.

All Risk Management Authorities should;

- Communicate with affected residents where their assets have given rise to the flooding of properties.
- Review the appropriateness of their response to flooding.
- Determine the integrity and/or capacity of their assets and their maintenance where they have contributed to the flooding of properties to understand the systems role in accommodating rainfall events as well as mitigating flooding.

Property owners of affected properties should;

- Confirm the integrity, capacity and appropriateness of their property drainage.
- Determine if works are needed to remove the risk posed by structures that form obstructions to flows.
- Determine if it is appropriate for them to protect their buildings through flood protection measures.

- Seek their own legal advice if they are concerned about the responsibilities and liabilities of themselves and/or others.
- **All property owners** should remove any inappropriate surface water connections to the foul sewer system and direct flows to alternative points of discharge where it doesn't increase flood risk.
- Should consider installing property protection measures. Residents can apply for a grant towards the cost of flood protection measures at this [link](#).

Norfolk County Council should;

- Work with partner organisations to identify funding for flood mitigation. This would include assessing the potential to install property level protection measures, reduce run-off and increase the attenuation of flood water to reduce the impacts of flooding. Property owners could also carry out their own measures where funding is not forthcoming or residents are unwilling to wait for measures to be approved through national funding schemes.
- Work with property owners to assess the road structure to identify if it could be amended to route flood water away from the affected properties to alternative points of discharge, or other solutions as practicable.
- Seek to remind riparian owners of their responsibility to undertake appropriate levels of maintenance to sustain the efficiency of the drainage systems.
- Communicate with local residents to advise them of the appropriate measures they could take to protect their property without prejudicing the rights and responsibilities of adjoining property holders.
- Determine if works are needed to remove the risk posed by structures that form obstructions to watercourse flows and communicate with affected parties and riparian owners.
- Review and monitor the delivery of recommendations within this and other relevant flood investigation reports.

Anglian Water should;

- Work with partner organisations to identify the potential for managing the amount of surface water entering their drainage system in flood events.

Breckland District Council should;

- Review their approach to the use of their permissive to maintain watercourses powers under the Land Drainage Act 1991

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 year event and the 1 in 100 year event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 year event:	2	154	32
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	4	341	44
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 year event:	2	4	0
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 year event:	2	26	0
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 year event:	0	0	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 year event:	0	8	0

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 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.

9 of the incidents (45%) of internal flooding in this catchment are within 2.5km of a rain gauge. The rainfall events recorded by gauges for this catchment are;

16 August 2020 – 146.8mm rainfall was recorded as falling in 6 hours 30 minutes at the Watton STW rainfall monitoring station. This intensity of rainfall for the total duration equates to over a 1:1000 storm event, meaning there is less than a 0.1% chance of a storm this size occurring in any given year.

Historic flooding incidents within the catchment

The following table lists flooding incidents within the catchment that have been recorded:

Date of incident	Impact	Rainfall intensity
23 June 2016	Three properties on Pages Lane were internally flooded on 23 rd June 2016.	Intense rainfall
23 June 2016	Four properties on Cley Lane were internally flooded on 23 June 2016.	Intense rainfall
23 June 2016	One property on Glebe Road was internally flooded.	1 in 46-year rainfall event
23 June 2016	Two properties on Horseshoe Close were internally flooded.	Intense rainfall
23 June 2016	Three properties on Lovell Gardens were internally flooded.	Intense rainfall
23 June 2016	Two properties on Swaffham Road were internally flooded.	1 in 46-year rainfall event
23 June 2016	One property on Jubilee Road was internally flooded.	1 in 46-year rainfall event
23 June 2016	One property on Nelson Court was internally flooded.	1 in 46-year rainfall event
23 June 2016	One property on Brandon Road was internally flooded.	1 in 46-year rainfall event

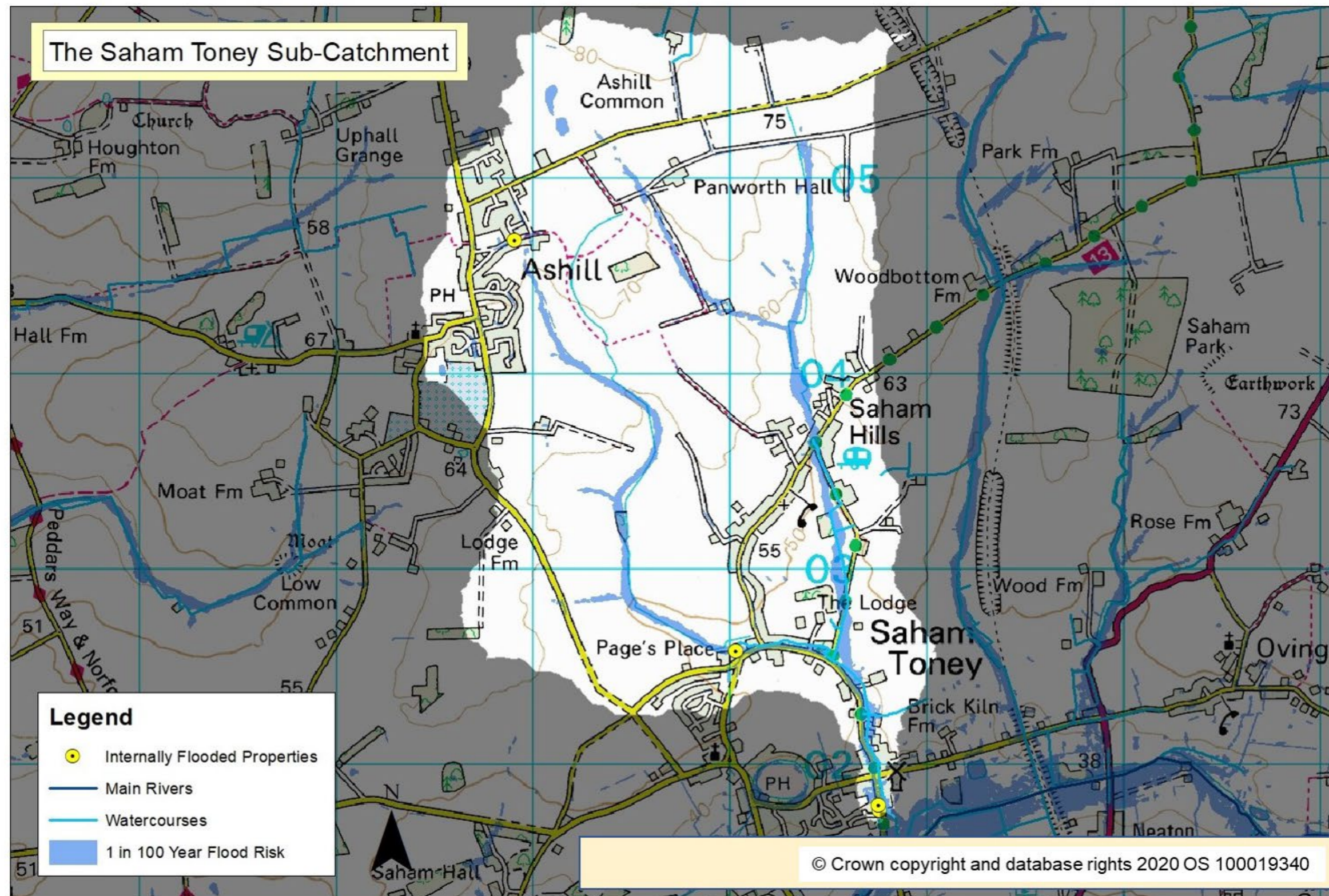
The properties above are covered in the Watton 2016 Flood Investigation and can be found at this [link](#).

Since the 2016 Flood investigations Norfolk County Council has:

- Has begun undertaking a feasibility study to assess the options to reduce flood risk in Watton.
- Undertaken work to identify the potential for storing water in the upper catchment of Saham Toney to reduce flood risk.
- Offered properties in and around Watton Property Flood Protection Measures.
- Jubilee Road – 2019 NCC highways made the addition of four new type 1 trapped gullies and 150mm pipes laid and connected to existing surface water system

Flooding and flood risk within the Saham Toney sub-catchment

Map 2



Description of catchment

Saham Toney is a rural catchment with two key watercourses. These watercourses converge at Pages Lane and flow south where they join the Watton Beck.

Flood incidents within this catchment

Date of Incident	Incident as reported	What was the response to the flood incident
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Pages Lane, Saham Toney. This incident was reported by: a Parish Councillor during a site visit on the 27 August 2020, (FWF/20/2735)</p> <p>Map 3</p>	<p>Norfolk County Council) visited affected residents to offer advice and to gather information after the incident.</p> <p>Norfolk County Council undertook works to raise the level of the kerb on the road after the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Cley Lane, Saham Toney. These incidents were reported by: a neighbour during a site visit on the 27 August 2020, (FWF/20/2594)</p> <p>a Parish Councillor during a site visit on the 27 August 2020, (FWF/20/2520)</p> <p>Map 3</p>	<p>Norfolk County Council visited affected residents to offer advice and to gather information after the incident.</p> <p>Anglian Water Services Ltd visited affected residents to offer advice and to gather information after the incident.</p> <p>Anglian Water Services Ltd carried out a survey to assess the integrity of their drainage system after the incident.</p> <p>Anglian Water Services Ltd carried out measures to the affected properties to help protect the properties from future flooding.</p> <p>A resident carried out measures to minimise the impact of flooding after the incident.</p>

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.

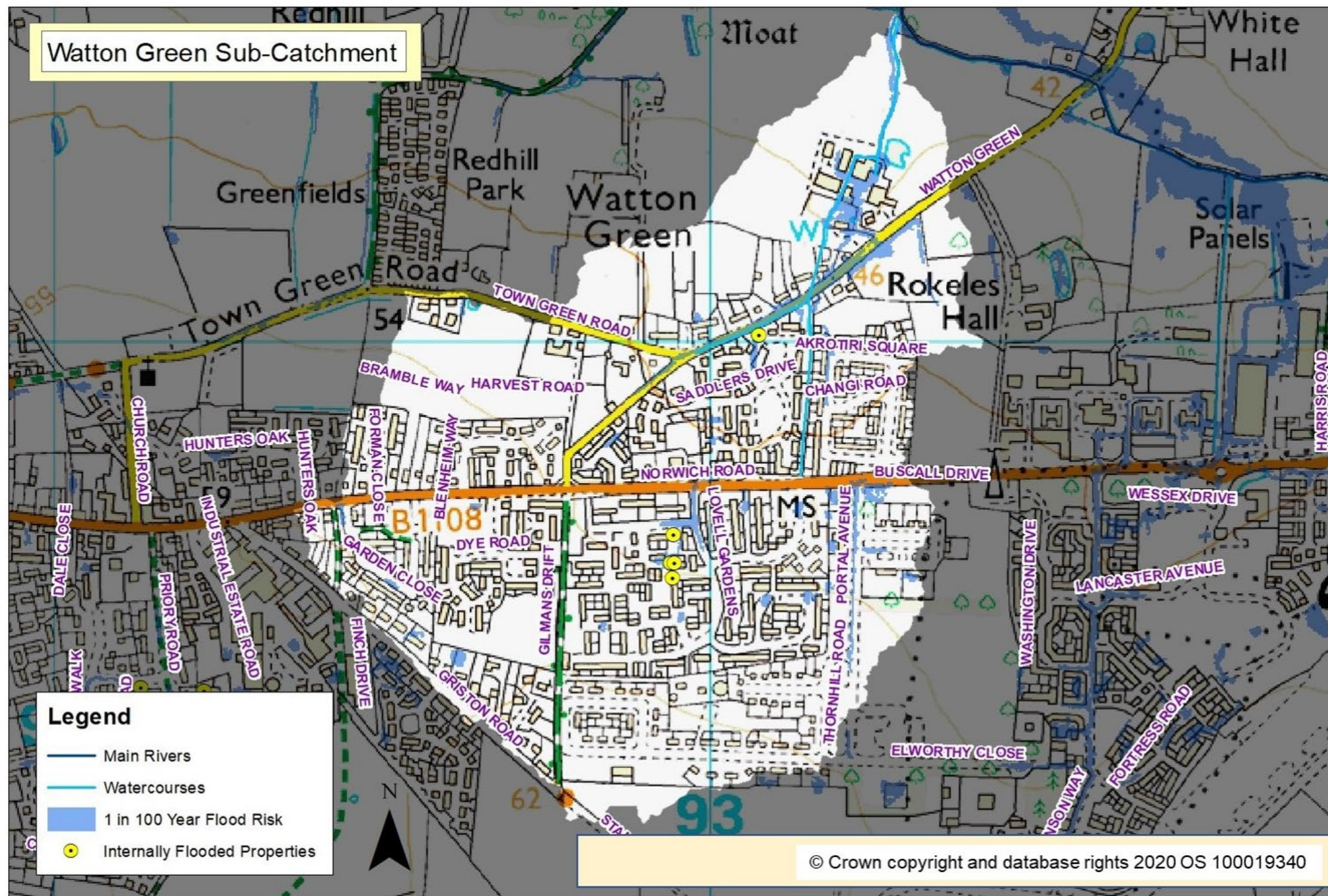
Pages Lane and Cley Lane, Saham Toney



Location	Causes	Recommendations
<p>Pages Lane - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was concentrated along overland flow paths on which the affected property sits • Surface run-off from significant rainfall flowed along the road network and onto the accesses of a neighbouring property and then was directed towards the affected property • The surface water drainage system is constricted by a pinch point downstream causing the water to back up 	<ul style="list-style-type: none"> • NCC should undertake maintenance on the ditch alongside Pages Lane to allow water from the road to flow to the ditch • NCC 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 should considering removing the trash screen on the culvert at the junction of Hills Road and ensure this does not impact the culverts structural integrity.
<p>Cley Lane - Report of internal flooding to two properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was concentrated along overland flow paths on which the affected property sits • Surface run-off from significant rainfall flowed along the road network and onto the accesses of affected properties that were situated lower than these features • Rainfall was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded. • The foul system surcharged within the property 	<ul style="list-style-type: none"> • NCC will investigate with third parties the potential to fund small scale improvement schemes to mitigate the risk experienced at this location. It is important to note this recommendation will be subject to the priorities and availability of resources of funders. • 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. • Norfolk County Council should consider Natural Flood Management options in the upper catchment that would reduce and delay the peak of flood water.

Flooding and flood risk within the Watton Green sub-catchment

Map 4



Description of catchment

Watton Green drains South to North towards a tributary of Watton Brook. This catchment is predominantly urban, with the majority of flood risk from surface water flows within the urban environment.

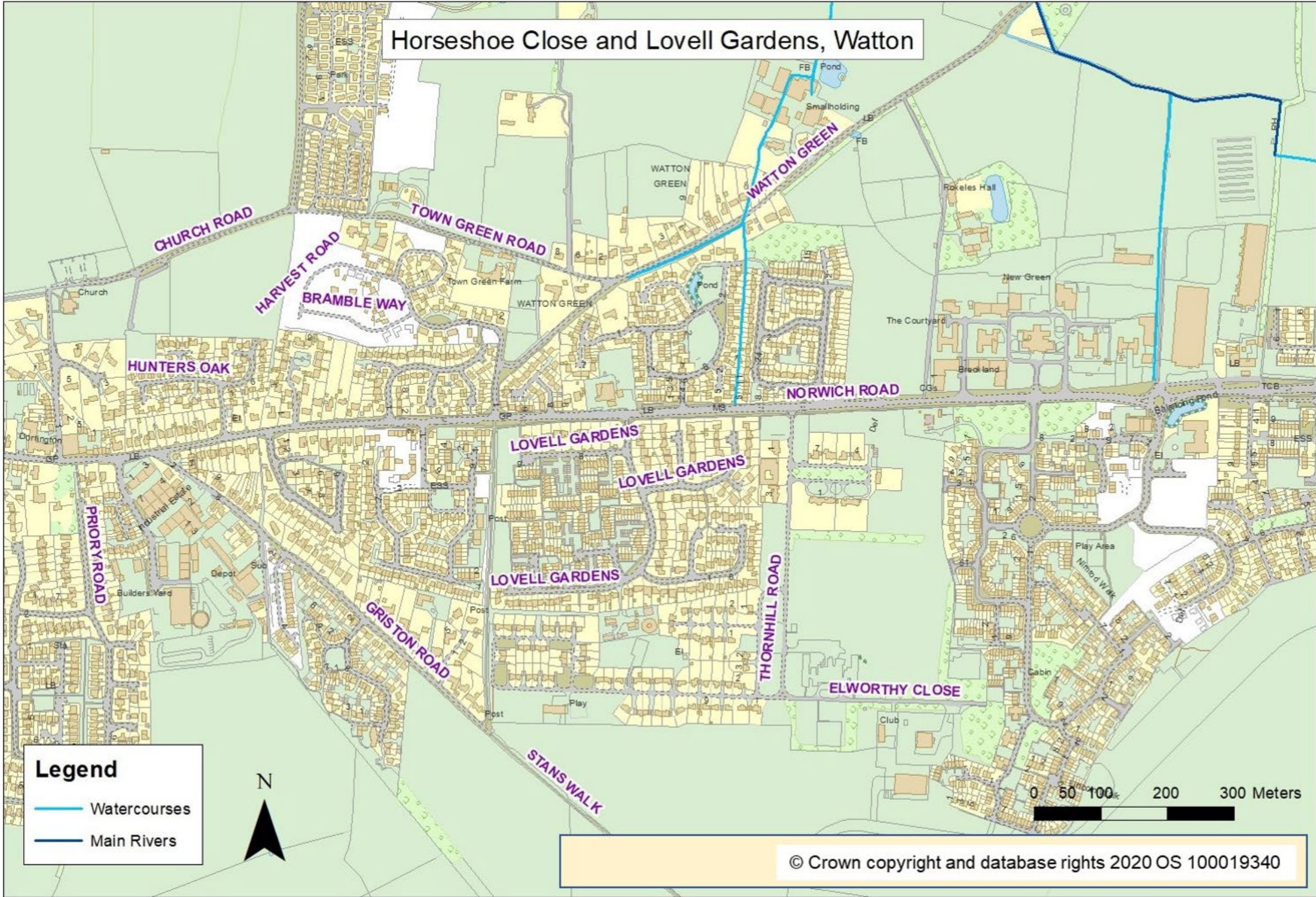
Flood incidents within this catchment

Date of Incident	Incident as reported	What was the response to the flood incident
16/08/2020	<p>On the 16/08/2020 - 5 properties were internally flooded on Lovell Gardens, Watton. These incidents were reported by:</p> <p>members of the public via personal communication on the 20 August 2020, (FWF/20/2572) & (FWF/20/2579)</p> <p>a resident via an online flood report form on the 18 August 2020, (FWF/20/2509), 20 August 2020, (FWF/20/2549) & the 21 August 2020, (FWF/20/2566)</p> <p>Map 5</p>	<p>A resident carried out measures to minimise the impact of flooding during the incident.</p> <p>Norfolk County visited affected residents to offer advice and to gather information after the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Horseshoe Close, Watton. These incidents were reported by:</p> <p>a resident via an online flood report form on the 18 August 2020, (FWF/20/2844)</p> <p>Norfolk County Council (Lead Local Flood Authority) via personal communication on the 18 August 2020, (FWF/20/2573)</p> <p>Map 5</p>	<p>Residents carried out measures to minimise the impact of flooding during the incident.</p> <p>Norfolk County Council visited affected residents to offer advice and to gather information after the incident.</p>

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.

Horseshoe Close and Lovell Gardens, Watton



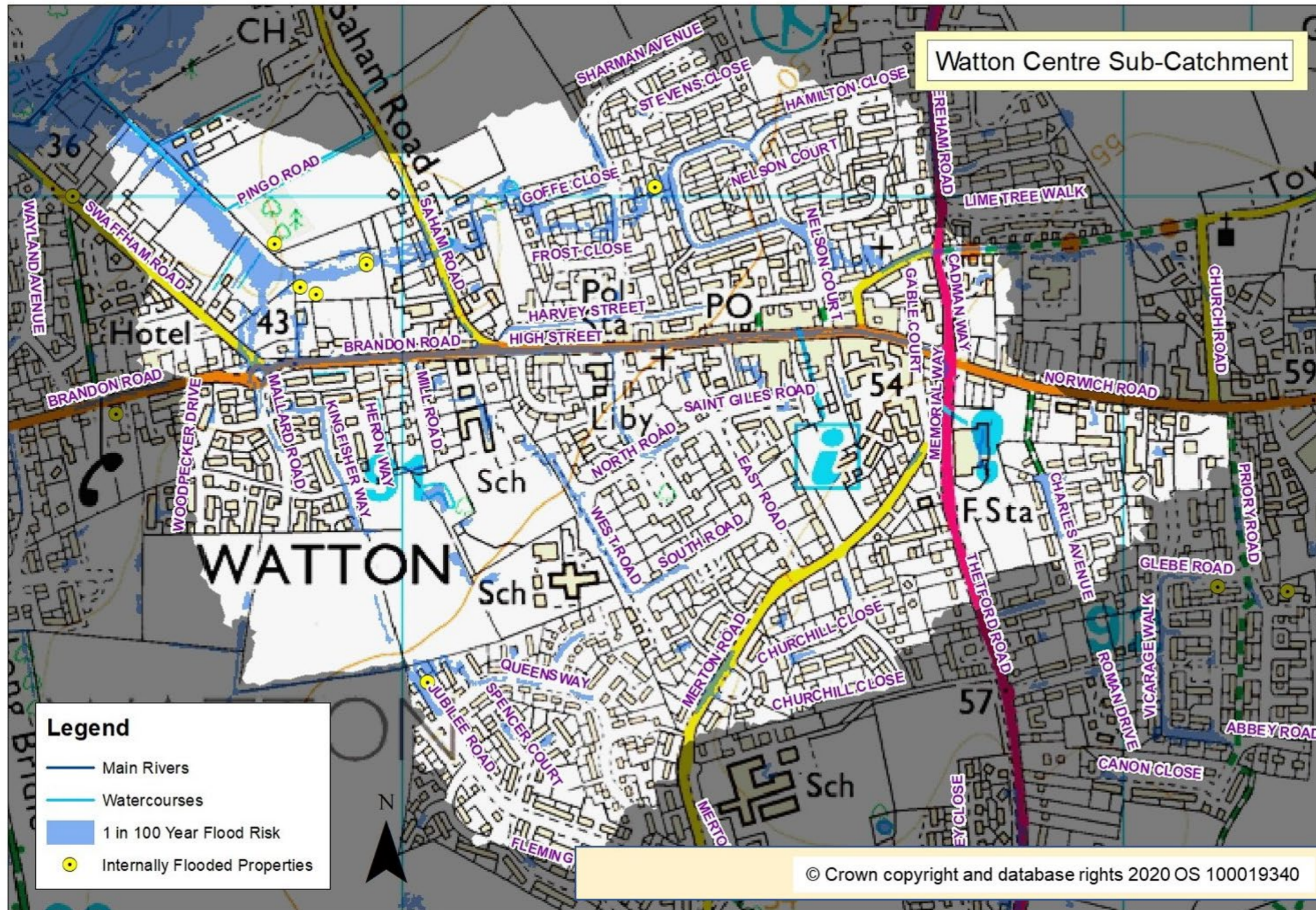
Legend

- Watercourses
- Main Rivers

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Location	Causes	Recommendations
<p>Lovell Gardens - Report of internal flooding to five properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was concentrated along overland flowpaths on which the affected properties are positioned on or are adjacent to. • Significant rainfall was also directed into the foul system causing it to surcharge, which contributed to the flooding at the affected properties. • The flood water entered the properties through low thresholds at entrances. 	<ul style="list-style-type: none"> • Norfolk County Council will investigate with third parties the potential for retro-fitting permeable areas and other methods of small scale sustainable drainage systems. • AW will review the capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.
<p>Horseshoe Close - Report of internal flooding to two properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was concentrated along overland flowpaths on which the affected properties are positioned on. • Run-off from significant rainfall was directed towards the surface water network. These flows could not be accommodated as the system was already overloaded. This directed flood water towards the affected properties and water entered the properties through low thresholds at entrances 	<ul style="list-style-type: none"> • AW will review the capacity & 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 will investigate with third parties the potential for retro-fitting permeable areas and other methods of small scale sustainable drainage systems. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available.

Flooding and flood risk within the Watton Centre sub-catchment



Description of catchment

Watton Centre is a small urban catchment that directs surface water towards a minor watercourse close to the flood plain of Watton Brook. The majority of the flood risk in the catchment is from surface water arising in the urban environment.

Flood incidents within this catchment

Date of Incident	Incident as reported	What was the response to the flood incident
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Jubilee Road, Watton. This incident was reported by: a resident via an electronic report on the 22 August 2020, (FWF/20/2557)</p> <p>Map 7</p>	<p>A resident carried out measures to minimise the impact of flooding during the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Nelson Court, Watton. This incident was reported by: a resident via an online flood report form on the 22 August 2020, (FWF/20/2552)</p> <p>Map 8</p>	<p>Norfolk County Council Norfolk County Council assessed validity and impact of the flood report after the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Sharman Avenue, Watton. This incident was reported by: a resident via an online flood report form on the 19 August 2020, (FWF/20/2525)</p> <p>Map 8</p>	<p>A resident carried out measures to minimise the impact of flooding during the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Swaffham Road, Watton. These incidents were reported by: The Fire and Rescue Service via an electronic report on the 17 August 2020, (FWF/20/2785) & (FWF/20/2559)</p> <p>Map 9</p>	<p>A resident responded and attempted to pump out during the incident.</p> <p>The Fire and Rescue Service responded and pumped out during the incident.</p>

<p>16/08/2020</p>	<p>On the 16/08/2020 - 1 property was internally flooded on Pingo Road, Watton. This incident was reported by: a resident via an online flood report form on the 18 August 2020, (FWF/20/2514)</p> <p>Map 10</p>	<p>The Fire and Rescue Service responded and pumped out during the incident.</p> <p>A resident carried out measures to minimise the impact of flooding during the incident.</p> <p>Norfolk County visited affected residents to offer advice and to gather information after the incident.</p>
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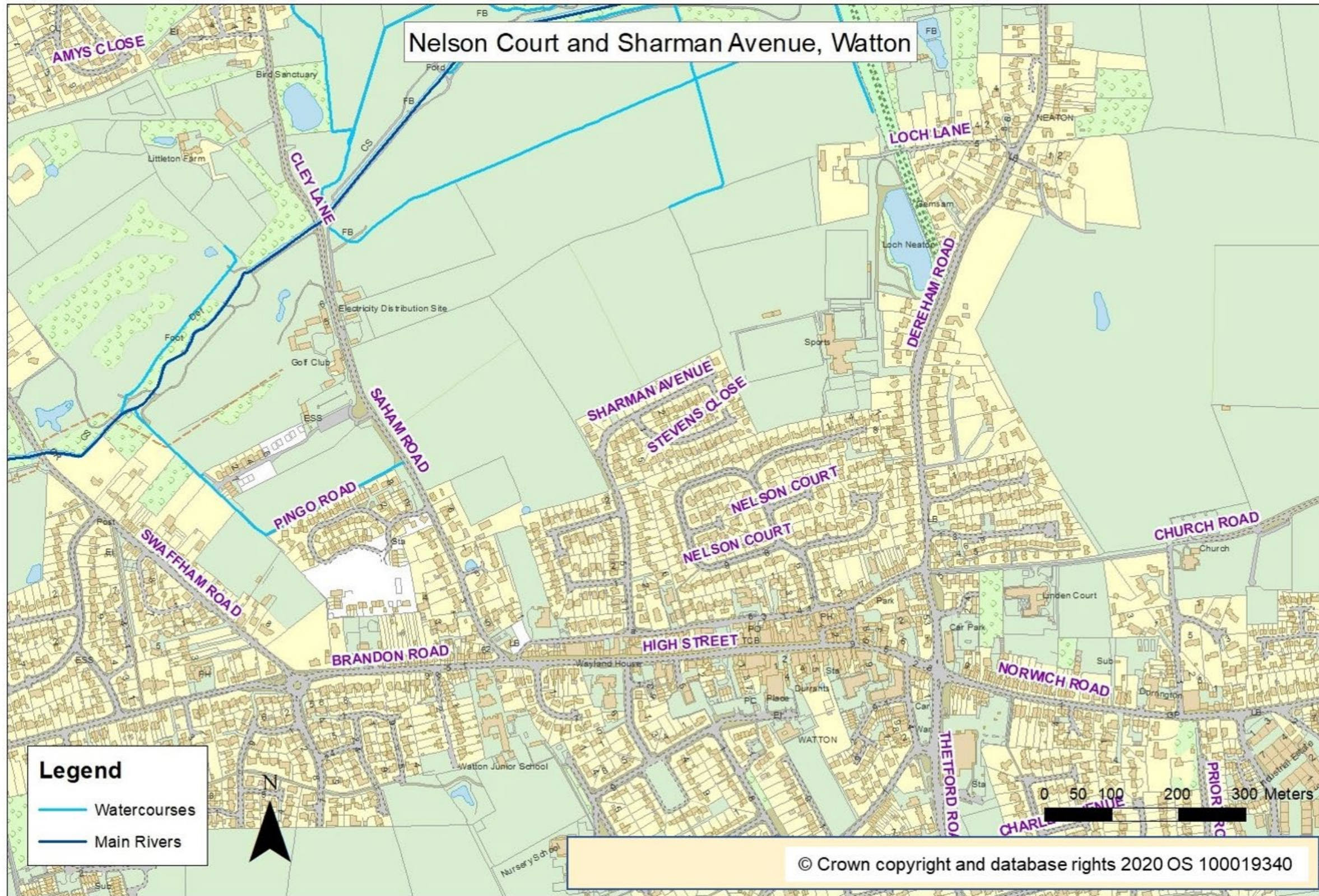
Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.



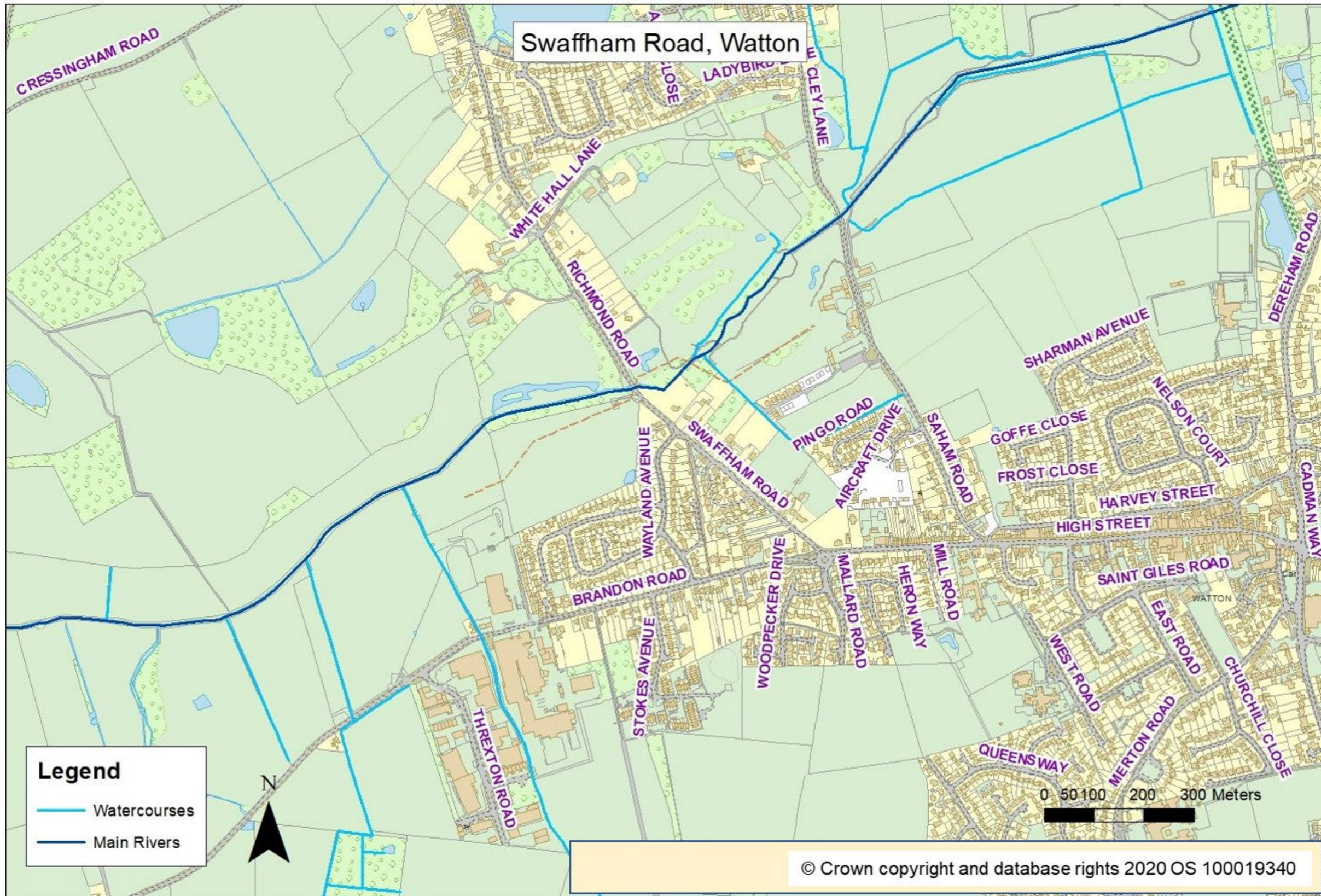
Location	Causes	Recommendations
<p>Jubilee Road - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded. This directed flood water towards the affected properties. • The loss of pre-existing drainage features such as drains, dykes, ditches etc. within the catchment exacerbated the flooding. 	<ul style="list-style-type: none"> • NCC will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable. • NCC could confirm, where possible, the existence of any connections to a wider drainage network. This work should seek to confirm where the drainage network conveys flows to. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.

Map 8

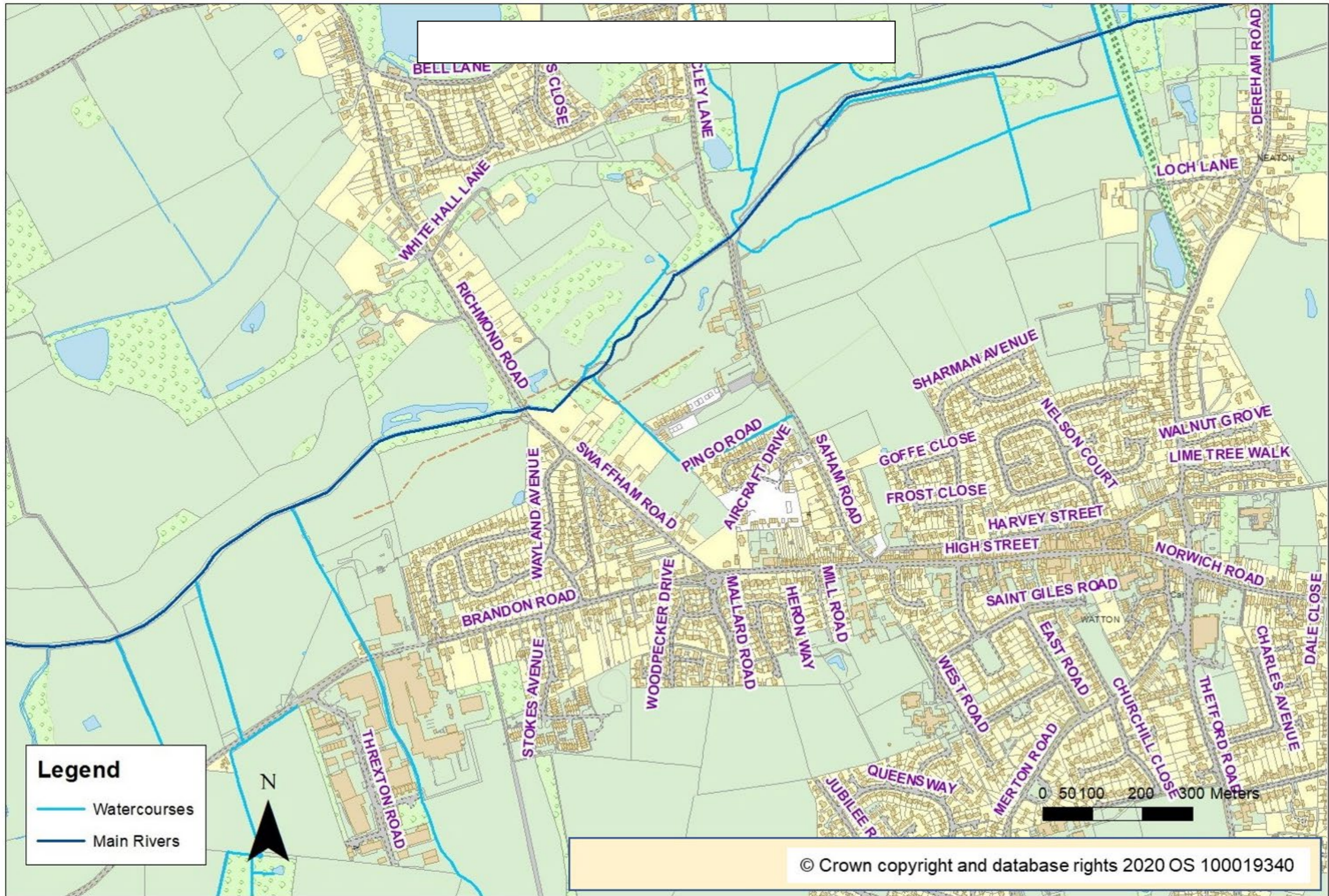


Location	Causes	Recommendations
<p>Nelson Court - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was concentrated along overland flow paths on which the affected property is positioned on. • Surface run-off also flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • The flood water entered the properties through low thresholds at entrances. 	<ul style="list-style-type: none"> • NCC will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable. • NCC will establish whether there has been the loss of the pre-existing watercourse connected to the existing highway outfall. • Norfolk County Council will investigate with third parties the potential to fund small scale improvement schemes to mitigate the risk experienced at this location. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.
<p>Sharman Avenue - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • The flood water entered the properties through low thresholds at entrances. 	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • The flood water entered the properties through low thresholds at entrances.

Map 9

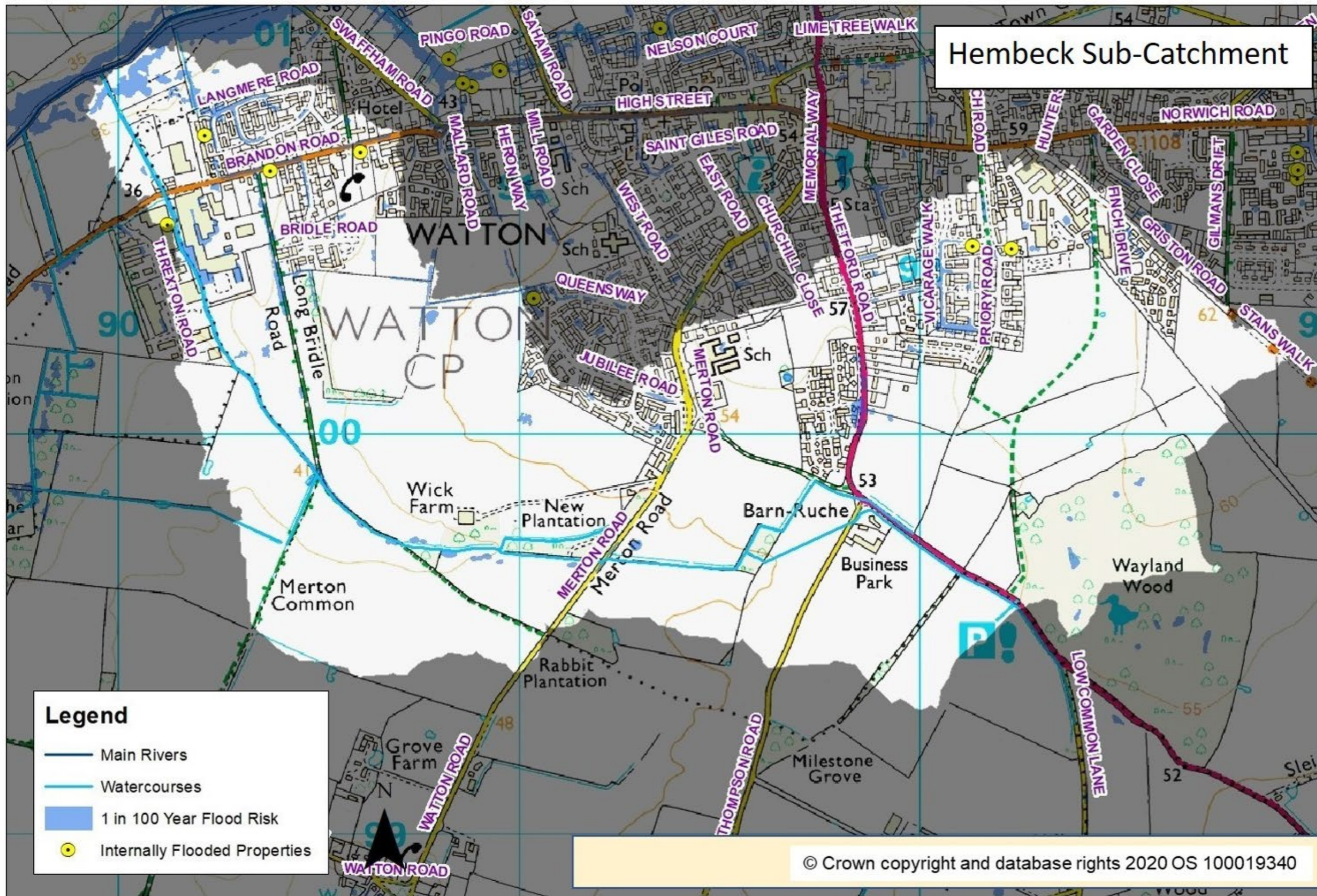


Location	Causes	Recommendations
<p>Swaffham Road - Report of internal flooding to two properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from significant rainfall made its way onto roads and flowed along the road network and onto the accesses of affected properties that were situated lower than these features • Significant rainfall was also directed into the surface water and foul system causing it to surcharge elsewhere. This surcharging contributed to the flooding at the affected properties 	<ul style="list-style-type: none"> • NCC and AW will review the capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available.



Location	Causes	Recommendations
<p>Pingo Road - Report of internal flooding to one property on the 16th August 2020</p> <p>Aircraft Drive - Report of internal flooding to four properties on the 16th August 2020</p>	<ul style="list-style-type: none"> Run-off from rainfall was concentrated along overland flowpaths on which the affected properties were constructed on or adjacent to. The surface water system network was partially obstructed. This reduced the efficiency of the upstream drainage system contributing to flooding at the affected properties. In addition, the watercourse (Watton Brook) that the system outfalls into is unmaintained and reduced the ability of the system to discharge, Surface water entered the foul sewer from the adjacent estate and surcharged onto Aircraft Drive Surface run-off from rainfall flowed along the private road network and onto the accesses of affected property. Due to the development of impermeable surfaces localised ground conditions caused run-off to be directed quickly from where it fell as rain to the areas of flooding. The flood water entered the property through the air bricks. As part of the determination of the planning permission for the site, the Environment Agency, as statutory consultee for flood risk requested that Anglian Water confirm that they have sufficient capacity to receive run-off from the development and that they will accept a connection from their site into their surface water drainage system. It should be noted that: <ul style="list-style-type: none"> Anglian Water identified existing capacity issues within the foul sewer network and raised concerns that the new development would increase flood risk to customers. Anglian Water offered offsite storage options which were not included in the final drainage strategy. Anglian Water had not formally accepted the planned discharge of surface water (S104) into their existing sewers from the development as part of the drainage strategy prior to determination of the planning permission and subsequent construction. 	<ul style="list-style-type: none"> Norfolk County Council (NCC) should work with the housing developer, Anglian Water, Local Planning Authority to consider opportunities to route overland flowpaths in high impact events (1% and 0.1% rainfall event) away from affected The owner of the road should review the capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified. NCC & Anglian Water should work with the housing developer to identify the potential for managing the amount or rate of surface water entering their drainage system in flood events. Anglian Water should work with partner organisations to identify the potential for managing the amount or rate of surface water entering their foul drainage system in flood events. Norfolk County Council will investigate with the housing developer and the district council the potential for retro-fitting permeable areas and other methods of small scale sustainable drainage systems Anglian Water will determine an appropriate maintenance regime for the security screen at the outfall of the surface water system within the Watton Brook in line with the risk identified and NCC will communicate with affected parties and riparian owners within the Watton Brook. LPAs should consult with statutory consultees for flood risk prior to discharging conditions to ensure approvals incorporate appropriate mitigation for both foul and surface water disposal. Local Planning Authorities should note that there is an automatic right to connect to the public sewer.

Flooding and flood risk within the Hembeck sub-catchment



Description of catchment

Hembeck drains to a tributary of Watton Brook. The catchment drains water from the urban fringe of Watton and extends from the old airfield in the East, tracks to the South of Watton eventually curving to the North to pass under Norwich Road through Thrextan Road Industrial Estate.

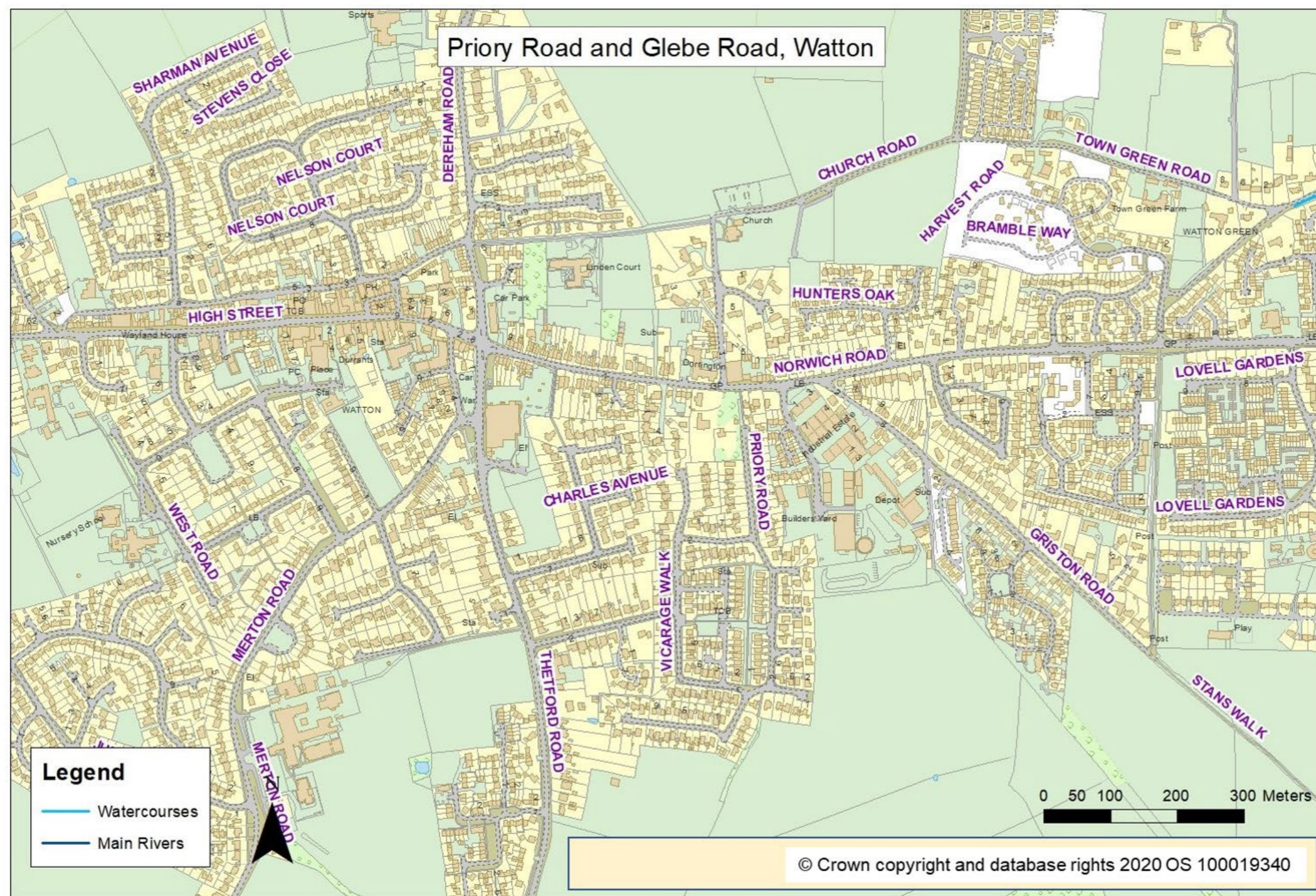
Flood incidents within this catchment

Date of Incident	Incident as reported	What was the response to the flood incident
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Priory Road, Watton. This incident was reported by: a resident via an online flood report form on the 18 August 2020, (FWF/20/2518)</p> <p>Map 12</p>	<p>Norfolk County visited affected residents to offer advice and to gather information after the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Langmere Road, Watton. This incident was reported by: the Fire and Rescue Service via an electronic report on the 17 August 2020, (FWF/20/2506)</p> <p>Map 13</p>	<p>A resident carried out measures to minimise the impact of flooding during the incident.</p> <p>Norfolk County Council visited affected residents to offer advice and to gather information after the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Glebe Road, Watton. This incident was reported by: a member of the public via email correspondence on the 21 August 2020, (FWF/20/2619)</p> <p>Map 12</p>	<p>A resident responded and pumped out during the incident.</p> <p>Norfolk County Council visited affected residents to offer advice and to gather information after the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Brandon Road, Watton. These incidents were reported by: the Fire and Rescue Service via an electronic report on the 17 August 2020, (FWF/20/2512)</p>	<p>Norfolk County Council Norfolk County Council assessed validity and impact of the flood report after the incident.</p>

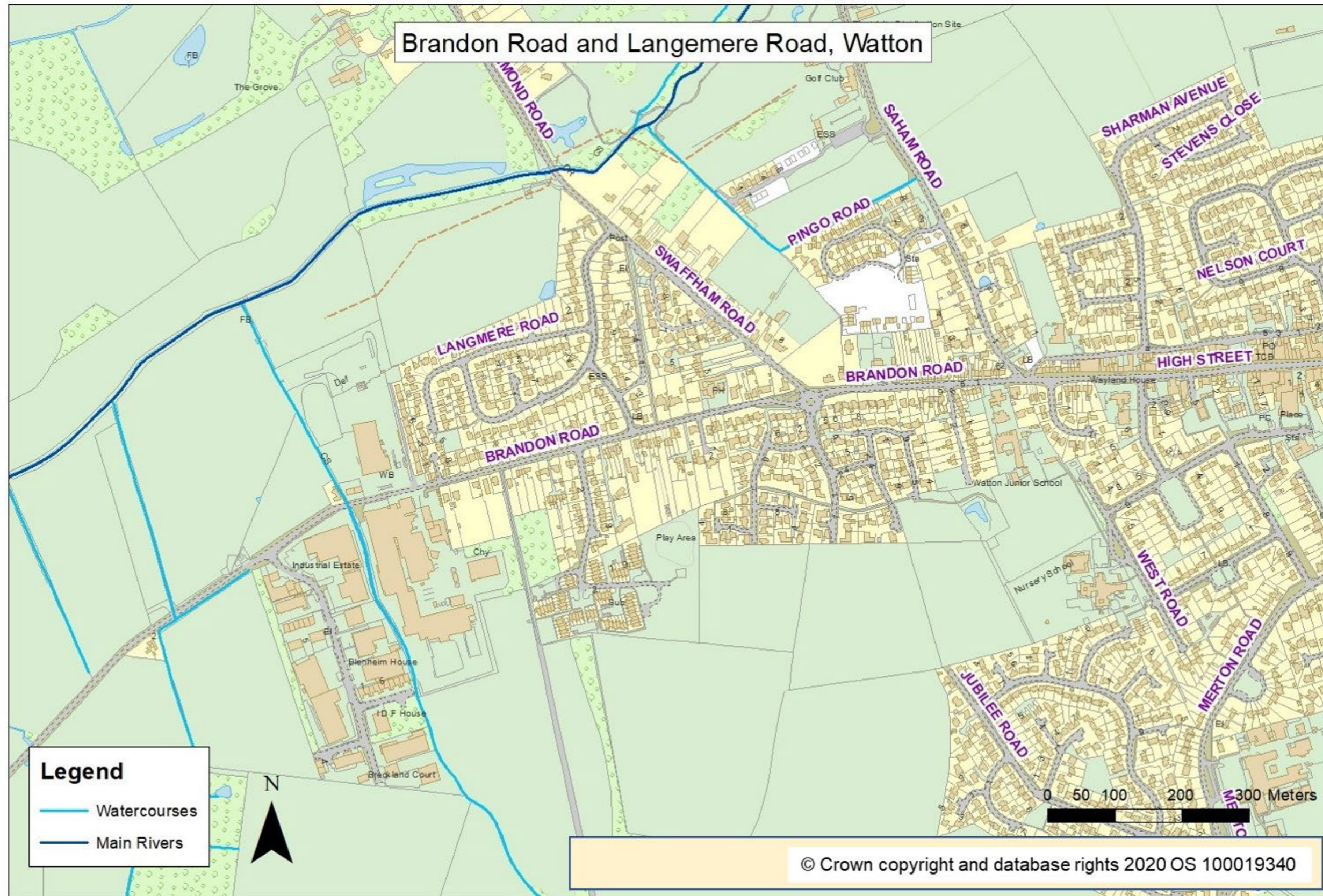
	a resident via an online flood report form on the 18 August 2020, (FWF/20/2517) Map 13	
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Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment



Location	Causes	Recommendations
<p>Glebe Road - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • 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 properties. • The flood water entered the properties through low thresholds at entrances. 	<ul style="list-style-type: none"> • NCC 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. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available
<p>Priory Road - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Water was directed from a neighbouring property by their roof drainage & large area of hardstanding towards the affected properties. • Run-off from significant rainfall was concentrated along overland flow paths on which the affected properties are positioned adjacent to. • The loss of pre-existing drainage features such as drains, dykes, ditches, within the catchment may have exacerbated the flooding. 	<ul style="list-style-type: none"> • Amendments should be made to neighbouring properties to ensure water is not directed to other properties • NCC will liaise with local land/riparian owners to ensure any localised land drains and ditches have been maintained to a required standard. •

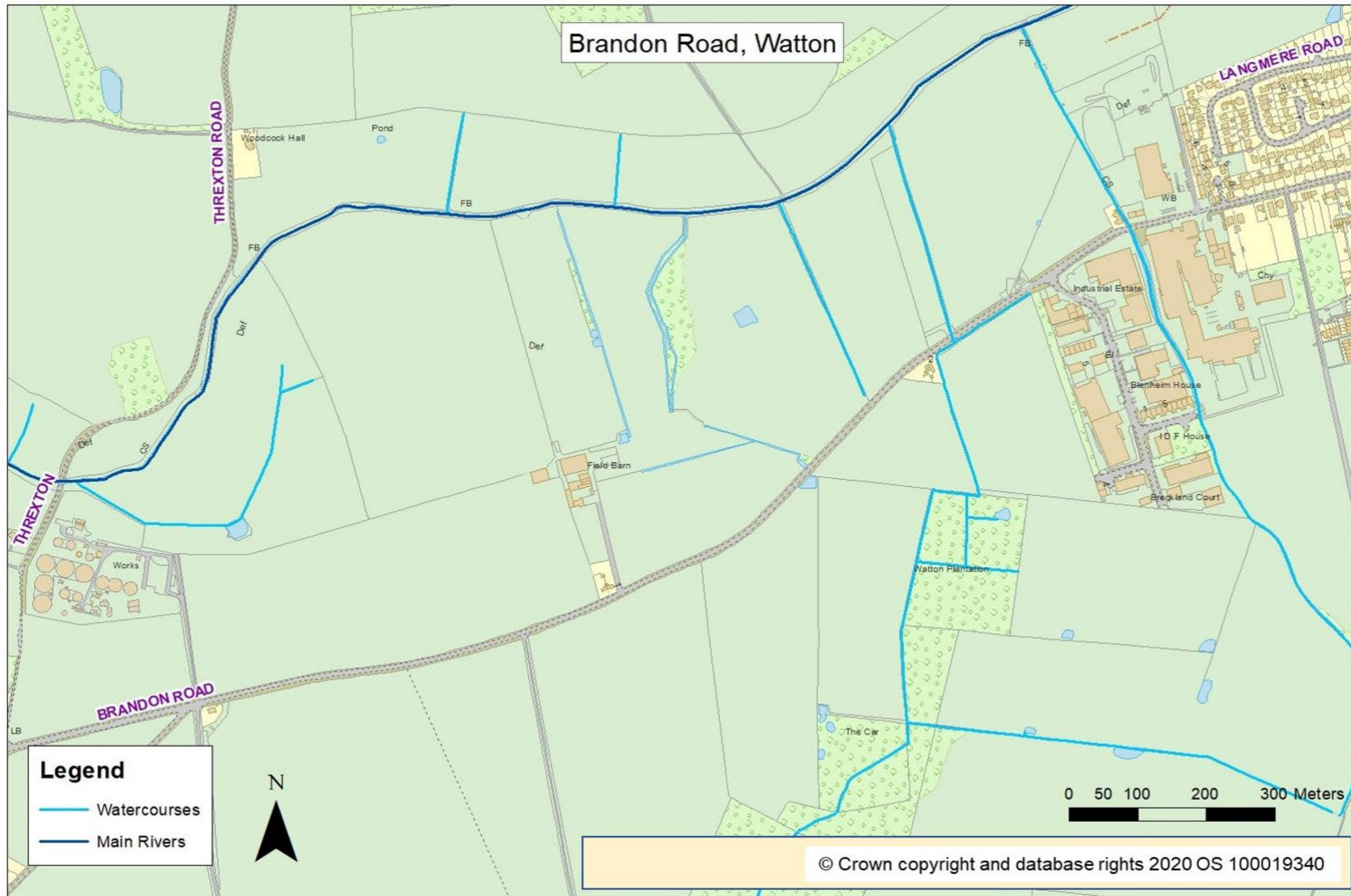


Location	Causes	Recommendations
Langmere Road - Report of internal flooding to one property on the 16 th August 2020	<ul style="list-style-type: none"> • Surface run-off from significant rainfall made its way onto roads and flowed along the road network and onto the accesses of affected properties that were situated lower than these features. 	<ul style="list-style-type: none"> • NCC will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable. • NCC will investigate with third parties the potential for retro-fitting permeable areas and other methods of small scale sustainable drainage systems.
Brandon Road - Report of internal flooding to two properties on the 16 th August 2020	<ul style="list-style-type: none"> • 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 properties. 	<ul style="list-style-type: none"> • Norfolk County Council 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 will investigate with third parties the potential to fund small scale improvement schemes to mitigate the risk experienced at this location.

Flooding and flood risk within Little Cressingham

Flood incidents within this catchment

Date of Incident	Incident as reported	What was the response to the flood incident
16/08/2020	On the 16/08/2020 - 2 properties were internally flooded on Brandon Road, Little Cressingham. These incidents were reported by: a resident via an online flood report form on the 17 August 2020, (FWF/20/2503) Map 14	A resident carried out measures to minimise the impact of flooding during the incident. Norfolk County Council assessed validity and impact of the flood report after the incident.



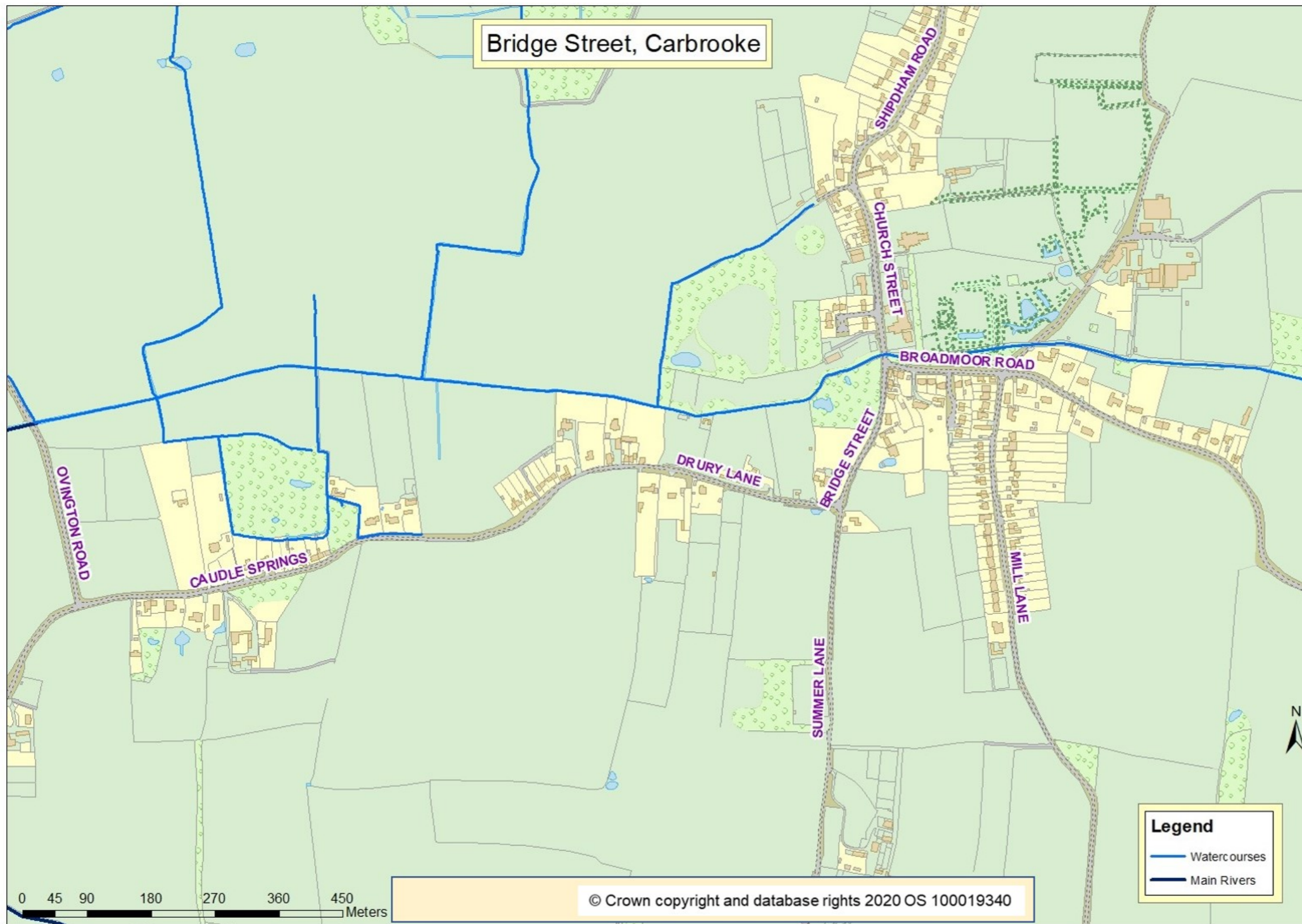
Location	Causes	Recommendations
Brandon Road - Report of internal flooding to two properties on the 16 th August 2020	<ul style="list-style-type: none"> • Surface run-off from significant rainfall flowed along the road network and onto the accesses of affected properties that were situated lower than these features. • The flood water entered the properties through low thresholds at entrances. 	<ul style="list-style-type: none"> • Norfolk County Council 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 will liaise with local landowner/riparian owners to ensure any localised land drains and ditches have been maintained to a required standard. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.

Flooding and flood risk within Carbrooke

Flood incidents within this catchment

Date of Incident	Incident as reported	What was the response to the flood incident
16/08/2020	On the 16/08/2020 – 1 property was internally flooded on Bridge Street, Carbrooke. Although officers were made aware further properties were internally flooded, the team only received a formal report for one property. This incident was reported by:	<p>A resident carried out measures to minimise the impact of flooding during the incident.</p> <p>Norfolk County Council visited affected residents to offer advice and to gather information after the incident.</p>

	<p>a resident via an online flood report form on the 28th August 2020, (2532).</p> <p>This property has come very close to being internally flooded multiple times since.Error! Reference source not found.</p>	
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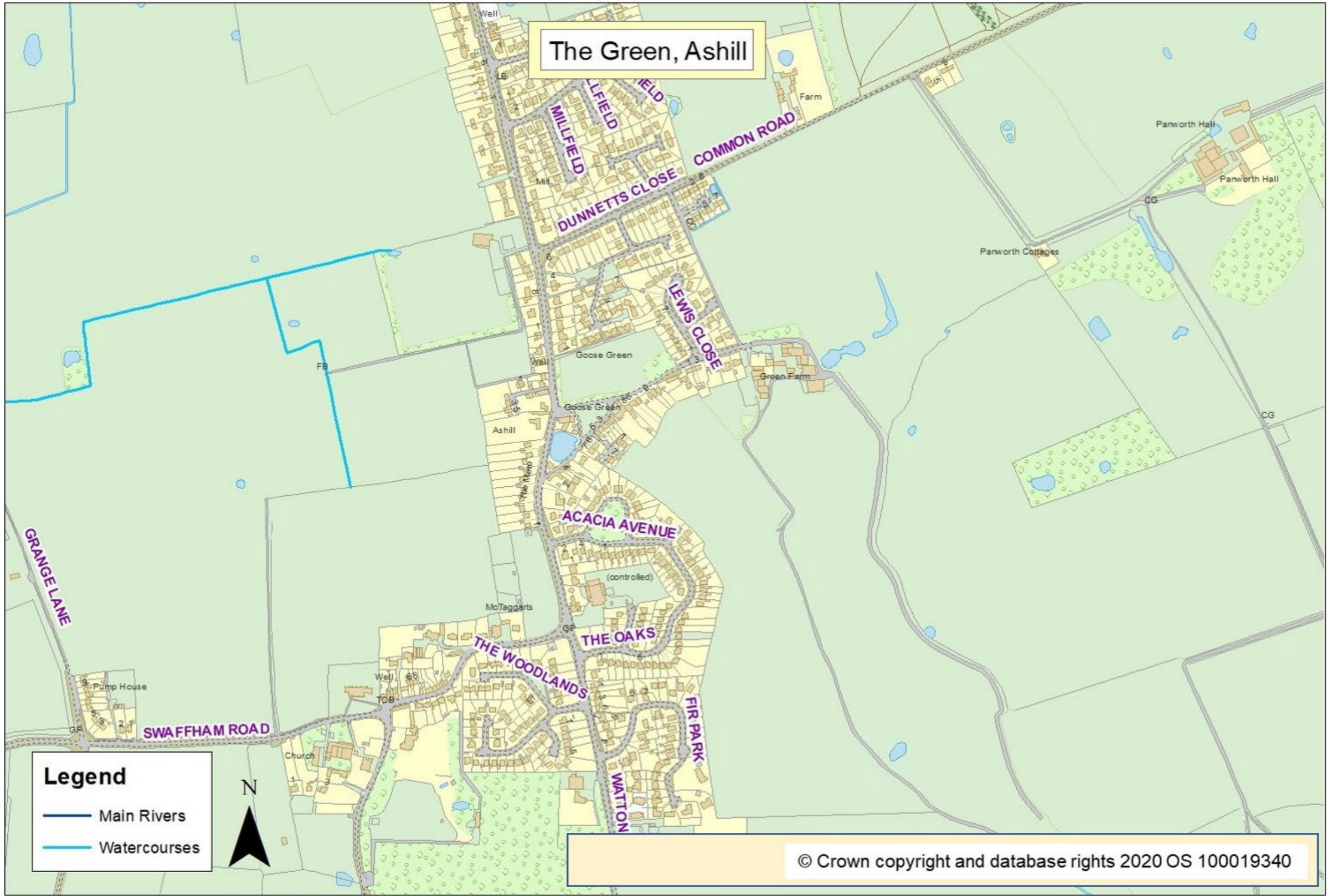


Location	Causes	Recommendations
<p>Bridge Street - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> Surface run-off from significant rainfall made its way onto the highway and flowed along the road network into the surface water drainage network. These flows could not be accommodated as the system was already overloaded and partially obstructed by debris and silt. This directed flood water towards the affected property. Water also surcharged out of a drain next to the property. 	<ul style="list-style-type: none"> Norfolk County Council will review the capacity & 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. This may require a survey of the system being undertaken. The drain next to the property needs to be traced. Riparian owners of the watercourse should instigate a regular regime of maintenance to ensure the system is free from obstruction (i.e. tree leaves / roots) at all times. Norfolk County Council will write to riparian owners to remind them of their responsibilities.

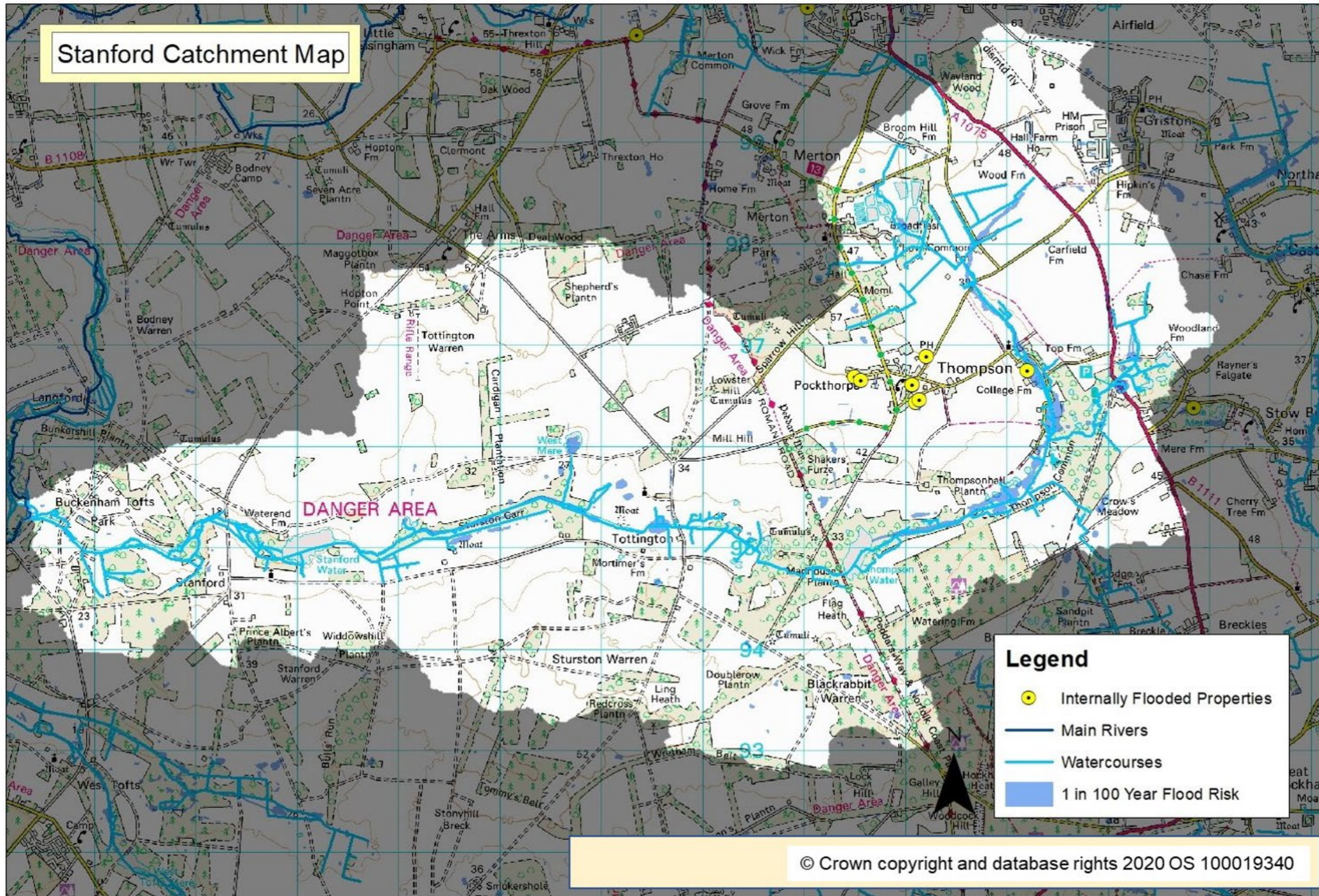
Flooding and flood risk within Ashill

Flood incidents within this catchment

Date of Incident	Incident as reported	What was the response to the flood incident
16/08/2020	On the 16/08/2020 – 1 property was internally flooded on The Green, Ashill. This incident was reported by: a resident via an online flood report form on the 15 September 2020, (FWF/20/2633) Map 16	A resident carried out measures to minimise the impact of flooding prior to the incident. Norfolk County Council visited affected residents to offer advice and to gather information after the incident.



Location	Causes	Recommendations
<p>The Green - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • 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. • Surface water then flowed along the road network and this directed flood water towards the affected property. • The flood water entered the property by travelling down a neighbours drive, under their floor and pouring through a party wall. 	<ul style="list-style-type: none"> • NCC will review the capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available.



Description of catchment

This is a large rural catchment with a flow path following the watercourse flowing north to south through the eastern part of Thompson

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 year event and the 1 in 100 year event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 year event:	1	1	1
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	1	2	1
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 year event:	1	2	1
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 year event:	1	2	1
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 year event:	1	1	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 year event:	1	1	0

Flood incidents within this catchment

The flooding in the Stanford Catchment was concentrated across Pockthorpe and Thompson. Within this catchment eight properties were affected. These were in the following areas:

- Pockthorpe Lane – 2 properties
- Hallfield Road – 2 properties
- Griston Road – 1 property
- Tottington Road – 2 properties
- College Road – 1 property

Key causes of flooding within this catchment

- Surface run-off from rainfall flowed along the road network and onto the accesses of affected property

- Rainfall pooled at a low point within the catchment
- Properties are situated on an overland flow path
- The outfall of the surface water system was reported to be blocked with debris
- Private drainage could not cope with the volume of rainfall
- Water entered the properties through low thresholds

Key recommendations

Our conclusion is that:

- Norfolk County Council should consider options to reduce route the flood water on the highway to an alternative discharge point
- Norfolk County Council should liaise with landowners to ensure the outfall of the pond is maintained to the required standard
- Residents should consider protecting their property with flood protection measures. Residents can apply for a grant towards the cost of flood protection measures at this [link](#)
- Property owner should review their drainage system

Flood incidents within this catchment

Within this catchment 8 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
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Pockthorpe Lane, Thompson. These incidents were reported by: Norfolk County Council via personal communication on the 27 August 2020, (FWF/20/2782) Norfolk County Council via personal communication on the 27 August 2020, (FWF/20/2781)</p> <p>Map 18</p>	<p>Norfolk County Council visited affected residents to offer advice and to gather information after the incident.</p>
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Griston Road, Thompson. This incident was reported by: Norfolk County Council via personal communication on the 27 August 2020, (FWF/20/2780)</p>	<p>Norfolk County Council Norfolk County Council assessed validity and impact of the flood report after the incident.</p>

	Map 19	
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Tottington Road, Thompson. These incidents were reported by: Norfolk County Council via personal communication on the 27 August 2020, (FWF/20/2779) Norfolk County Council) via personal communication on the 27 August 2020, (FWF/18/2778)</p> <p>Map 19</p>	Norfolk County Council visited affected residents to offer advice and to gather information after the incident.
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Hallfield Road, Thompson. These incidents were reported by: a member of the public via an online flood report form on the 17 August 2020, (FWF/20/2501) a member of the public via an online flood report form on the 16 August 2020, (FWF/20/2487)</p> <p>Map 20</p>	Norfolk County Council visited affected residents to offer advice and to gather information after the incident.
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on College Road, Thompson. This incident was reported by: a member of the public via an online flood report form on the 16 August 2020, (FWF/20/2486)</p> <p>Map 21</p>	<p>Norfolk County Council visited affected residents to offer advice and to gather information after the incident.</p> <p>Norfolk County Council carried out maintenance work to the highway drainage system 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 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. We note that a private, local rainfall monitoring system recorded 185.6mm of rain on the 16th August.

Historic flooding incidents within the catchment

The following table lists flooding incidents within the catchment that have been recorded:

Date of incident	Impact	Rainfall intensity
23/06/2016	Internal Flooding to property in Hallfield Road	Unknown

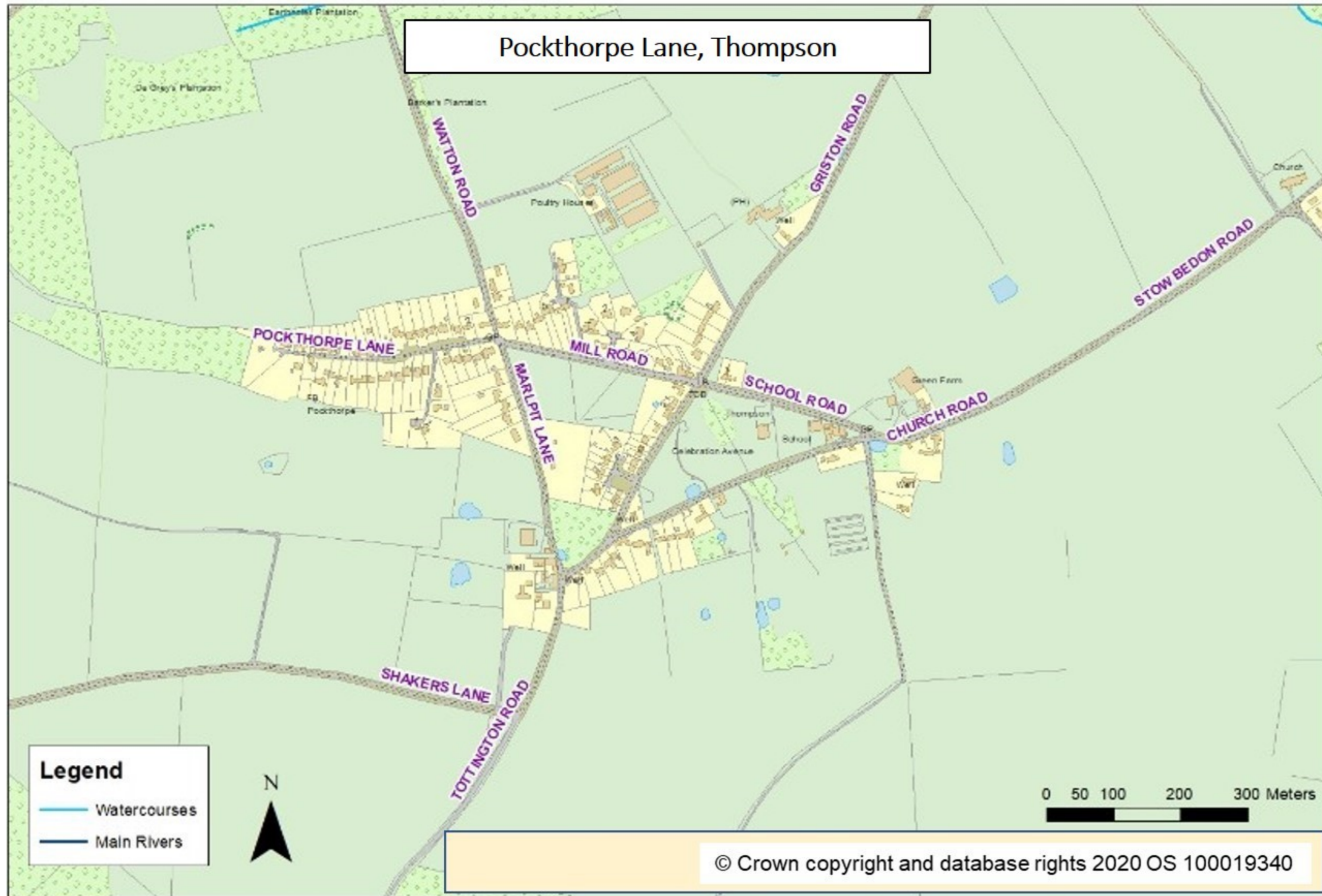
Properties in Hallfield Road have experienced repeat flooding. Previous reports of flooding to these properties were included in the Flood Investigation Report for Breckland Various 1 (FIR028), which can be found at [link](#).

In response to the recommendations contained within the flood investigation report in 2016, the following actions have taken place:

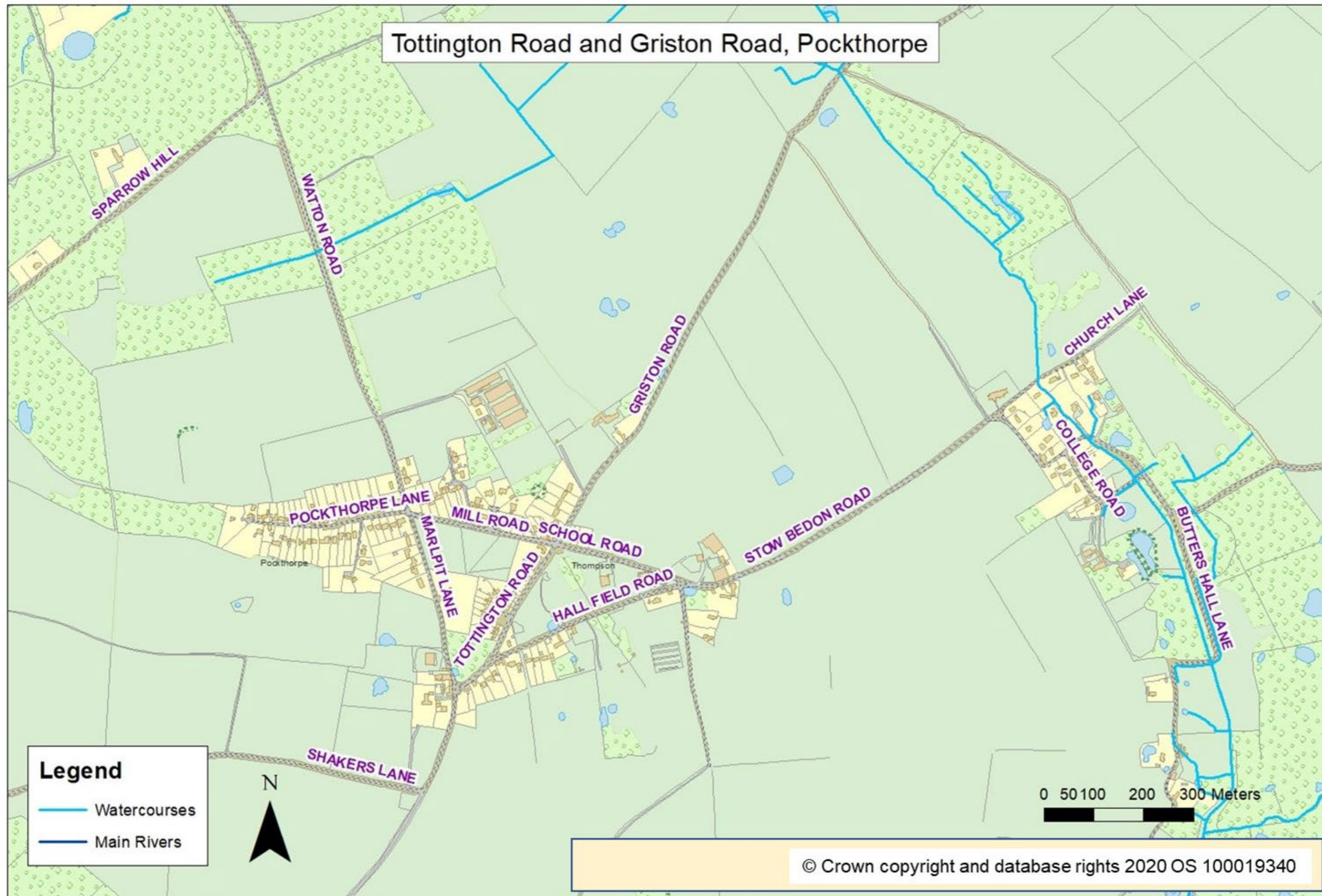
- Maintenance to the pond was carried out following the flood event by the landowner of the pond.
- NCC Highways carried out maintenance to the highway drainage system following the event.
- The entrance to one of the properties was raised by the resident to divert flow away from the property.

Causes of flooding within the catchment and recommendations

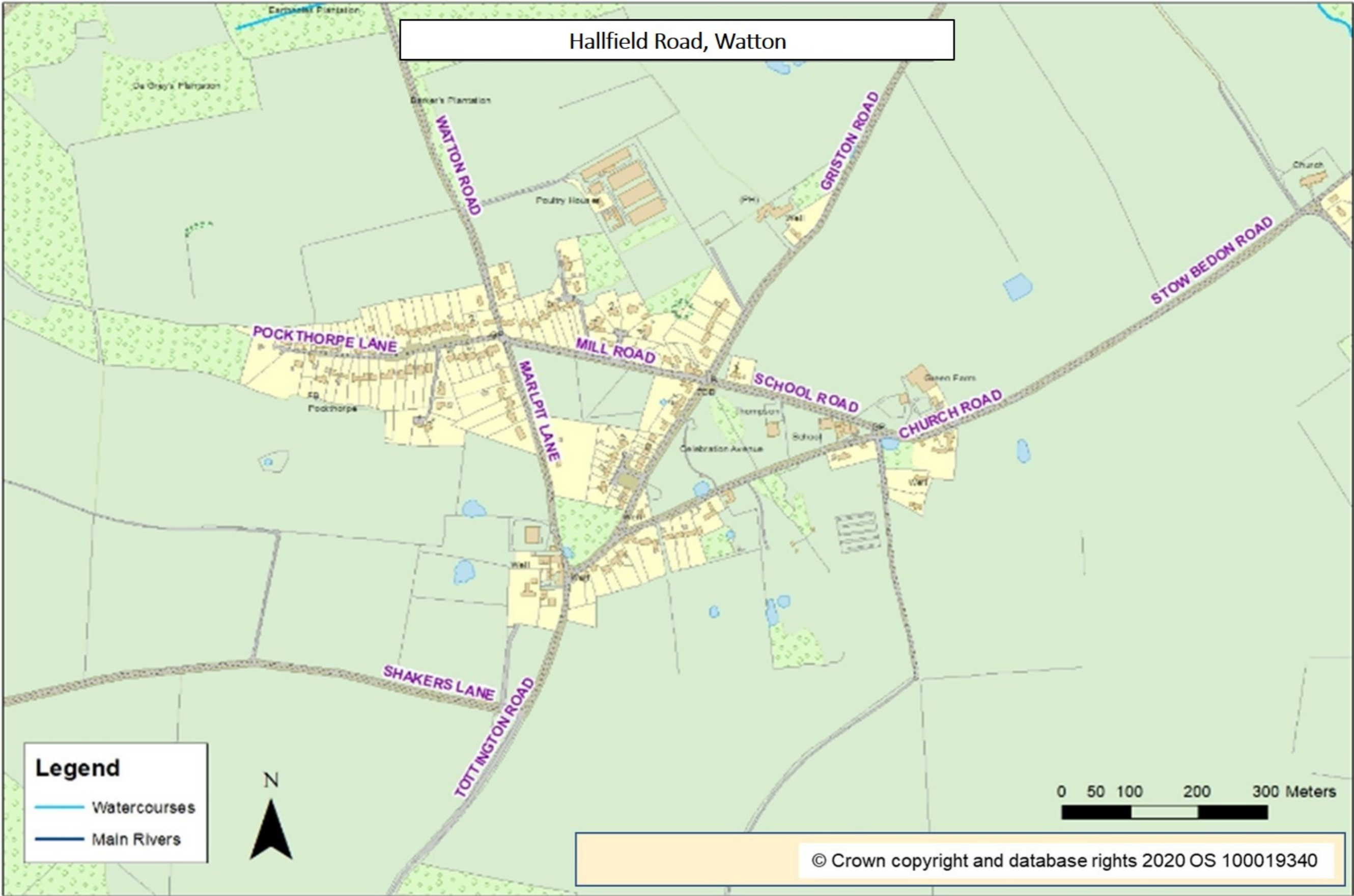
The findings of the investigation are detailed on the following pages. The maps detail the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.



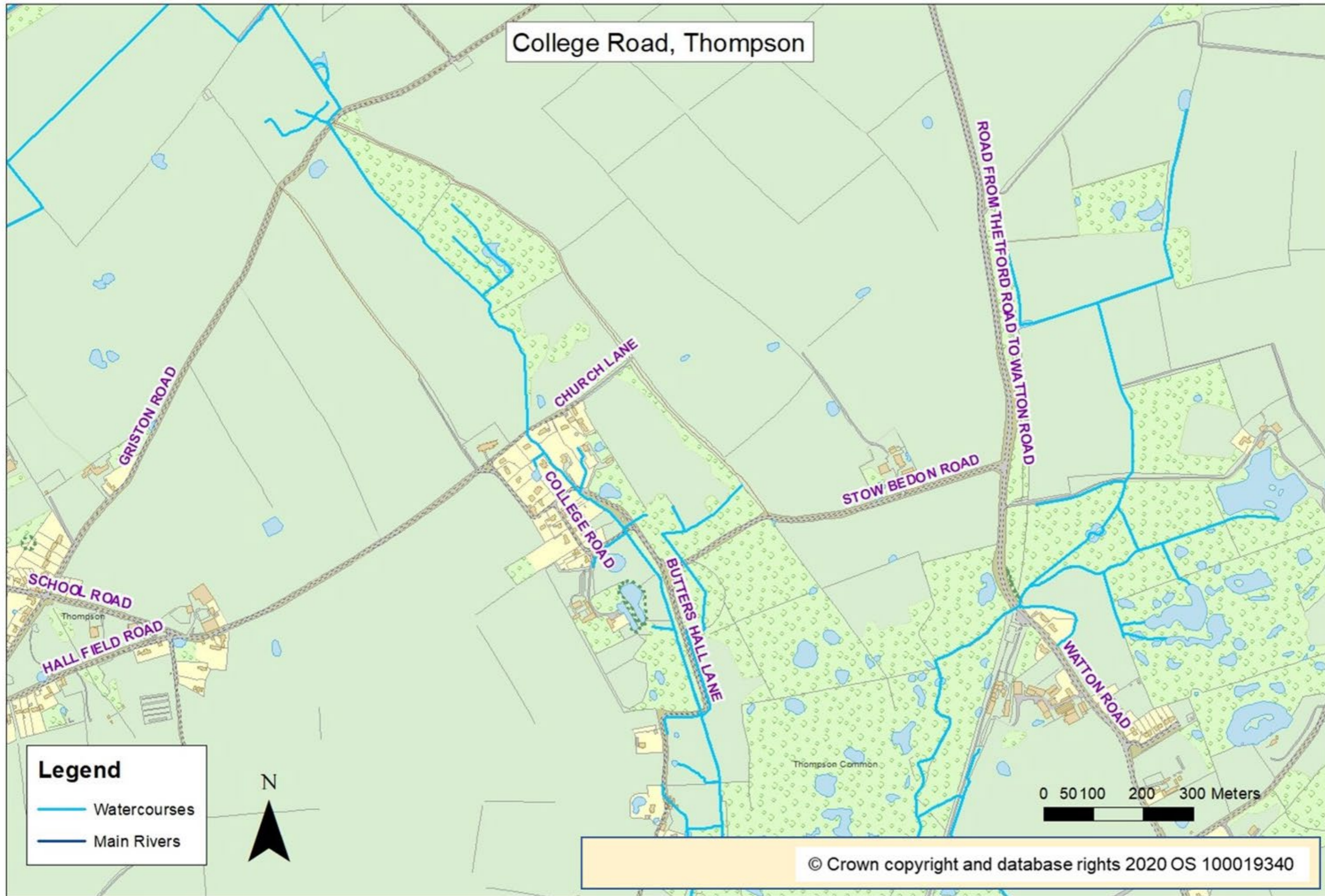
Location	Causes	Recommendations
<p>Pockthorpe Lane - Report of internal flooding to two properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • Run-off from significant rainfall was directed towards Individual property drainage. These flows could not be accommodated as the private drainage system is of insufficient capacity to deal with this amount of water. This directed flood water towards the affected property. 	<ul style="list-style-type: none"> • Norfolk County Council 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 will review the integrity, capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. • The property owner should review the capacity of their drainage system that serves the flooding property in line with the risk identified.



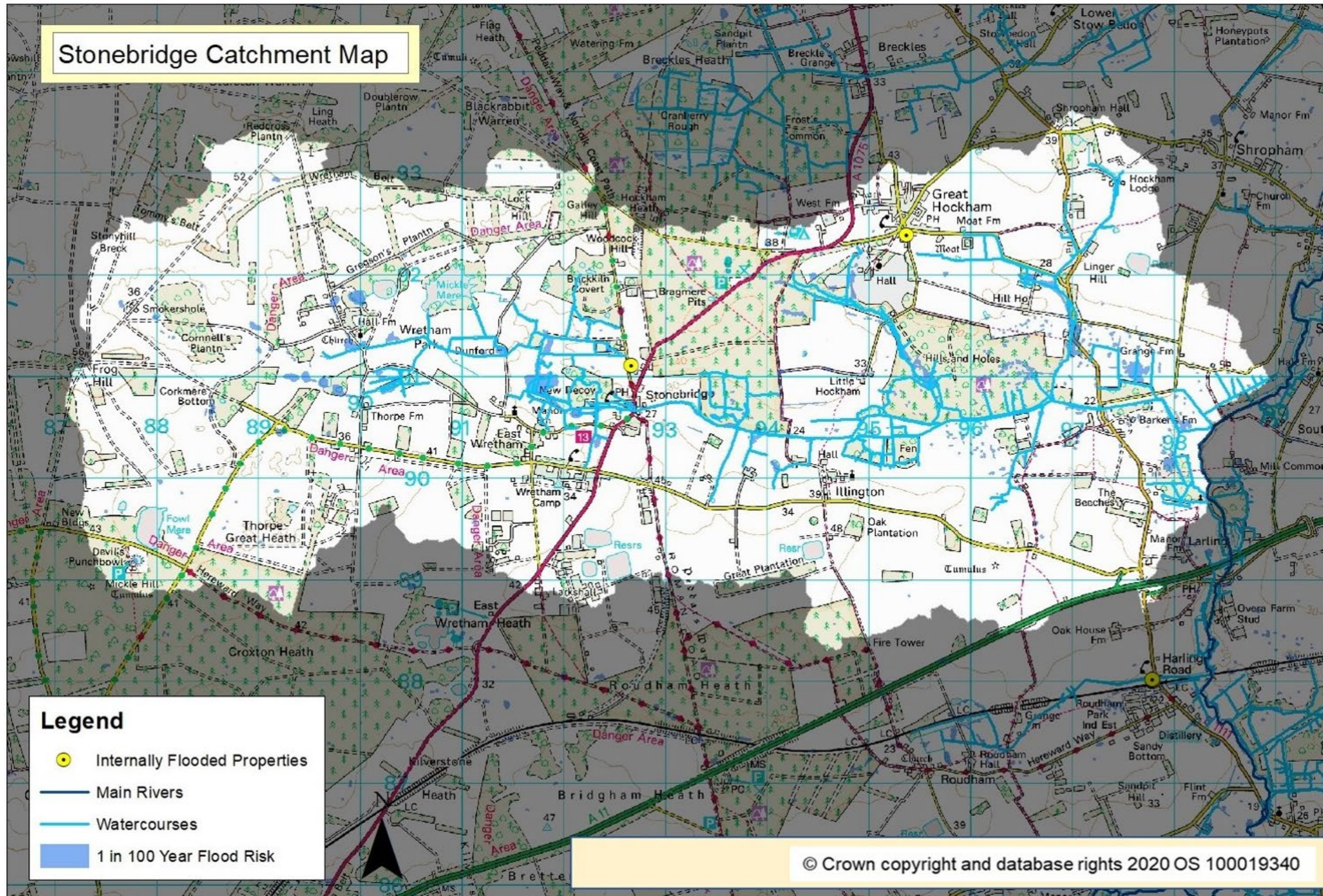
Location	Causes	Recommendations
<p>Tottington Road and Griston Road - Report of internal flooding to three properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed off adjacent fields and onto the accesses of affected properties that were situated lower than these features. • The flood water entered the properties through low thresholds at entrances. • The loss of pre-existing drainage features such as drains, dykes, ditches, ponds, culverts within the catchment exacerbated the flooding. 	<ul style="list-style-type: none"> • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. • The property owners should instigate a regular regime of maintenance to ensure the system is free from obstruction (i.e. tree leaves / roots) at all times.



Location	Causes	Recommendations
<p>Hallfield Road - Report of internal flooding to two properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from rainfall pooled at a low point within the catchment affecting properties. • Surface run-off from rainfall flowed along the road network and onto the accesses of affected properties which sits below the level of the road and pools around the property. • Due to blockages and the loss of pre-existing drainage features (such as drains, dykes, ditches, ponds, culverts) within the catchment this exacerbated the flooding. 	<ul style="list-style-type: none"> • Norfolk County Council will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. • Norfolk County Council will liaise with local landowner/riparian owners to ensure the local ditch network is maintained to a reasonable standard. • Norfolk County Council will investigate with third parties the potential to fund small scale improvement schemes. This could be Partnership funding or in conjunction with local communities.



Location	Causes	Recommendations
<p>College Road - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was concentrated along overland flowpaths on which the affected property is adjacent to. • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. 	<ul style="list-style-type: none"> • Norfolk County Council will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.



Description of catchment

This is a large rural catchment covering a number of hamlets with a significant number of watercourses.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 year event and the 1 in 100 year event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 year event:	0	5	0
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	0	6	0
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 year event:	0	0	0
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 year event:	0	3	0
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 year event:	0	0	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 year event:	0	1	0

Flood incidents within this catchment

Within this catchment 2 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
16/08/2020	On the 16/08/2020 - 1 property was internally flooded on Little Hockham Lane, Hockham. This incident was reported by: Norfolk County Council (Lead Local Flood Authority) via personal communication on the 27 August 2020, (FWF/20/2603) Map 23	Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. The Fire and Rescue Service responded and pumped out flood water.

16/08/2020	On the 16/08/2020 - 1 property was internally flooded on Woodcock Road, Wretham. This incident was reported by: a member of the public via an online flood report form on the 28 August 2020, (FWF/20/2597)	Norfolk County Council visited affected residents to offer advice and to gather information after the incident.
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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 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

Norfolk County Council Lead Local Flood Authority does not hold any records of internal flooding on Little Hockham Lane, Great Hockham or Woodcock Road, Wretham.

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The first 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. The second table sets out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.

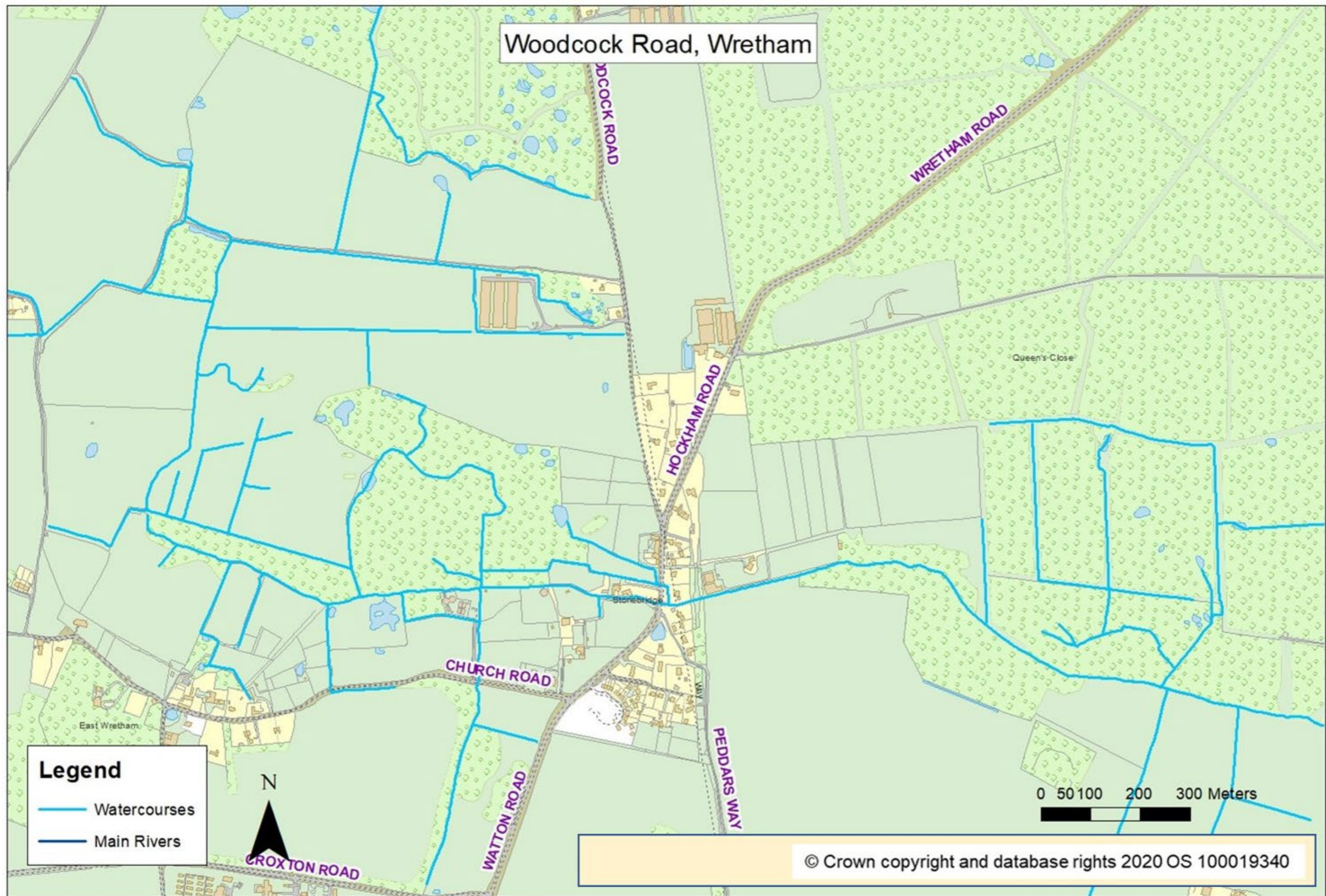
Following flooding to people, property and infrastructure;

- Risk Management Authorities should
 - communicate with affected residents where their assets have given rise to the flooding of properties.
 - review the appropriateness of their response to flooding.
 - 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.
- Property owners of affected properties should seek their own legal advice.
- NCC should

- incorporate all relevant information of actual flooding into the review of the Norfolk Preliminary Flood Risk Assessment (“PFRA”).
- review and monitor the delivery of recommendations within this and other relevant flood investigation reports



Location	Causes	Recommendations
<p>Little Hockham Lane - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • Water was directed from the private shared car park to towards the affected property. • The flood water entered the properties through low thresholds at entrances. 	<ul style="list-style-type: none"> • Norfolk County Council will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. • The property owner should determine the adequacy of the on-site drainage and where appropriate increase on-site storage capacity and system efficiency.



Location	Causes	Recommendations
Woodcock Road - Report of internal flooding to one property on the 16 th August 2020	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • The flood water entered the properties through low thresholds at entrances. 	<ul style="list-style-type: none"> • Norfolk County Council will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.

Flooding and Flood Risk in Litcham

Due to the isolated nature of the flooding at the property a catchment map has not been generated.

Flood incidents within this area

Within this catchment 1 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
16/08/2020	On the 16/08/2020 - 1 property was internally flooded on Church Street, Litcham. This incident was reported by: a resident via an online flood report form on the 24 August 2020, (FWF/20/2672) Map 25	Norfolk County Council visited affected residents to offer advice and to gather information after the incident. A resident carried out measures to minimise the impact of flooding during the incident. Norfolk County Council 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 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.

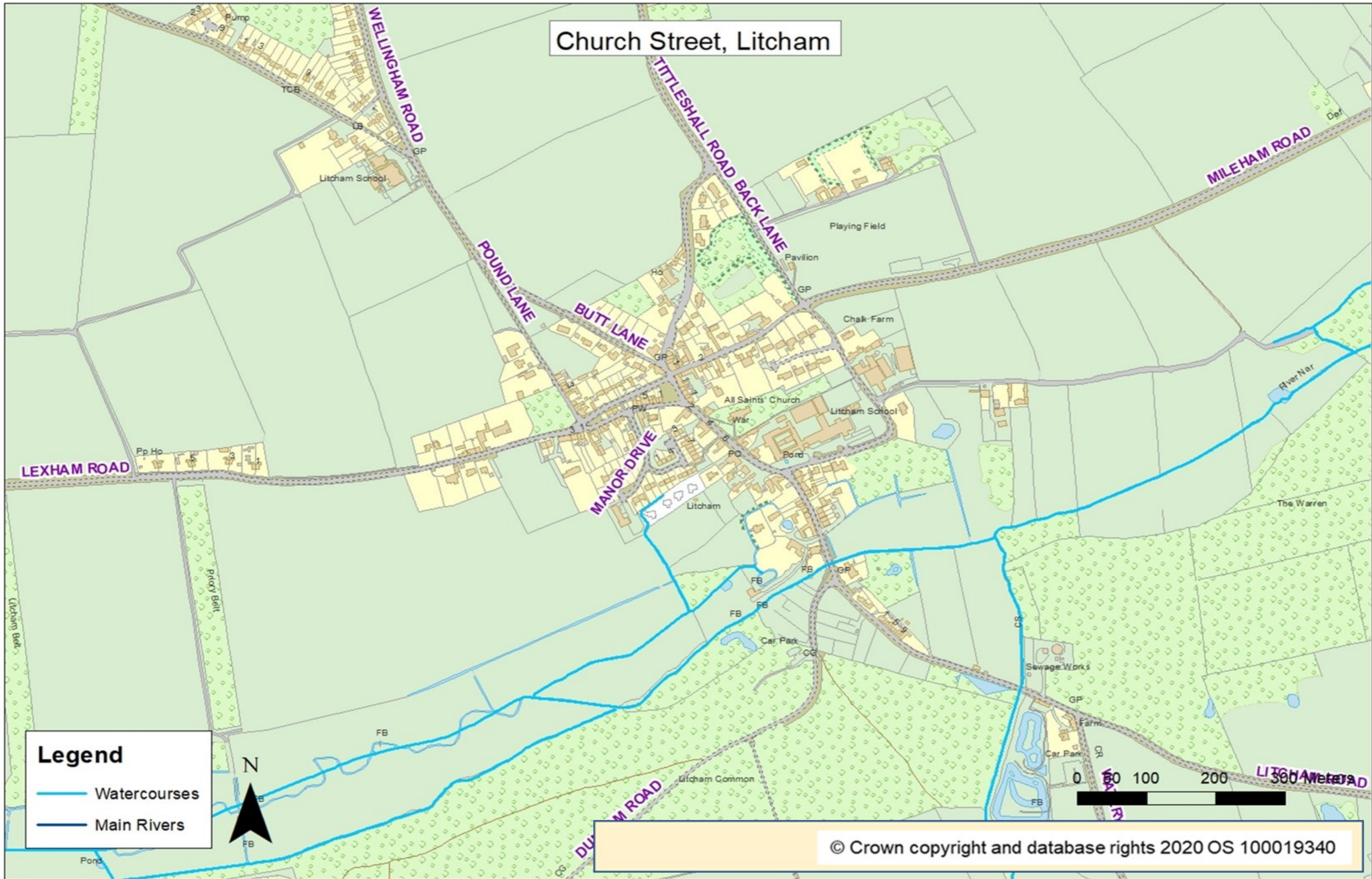
None of the incidents of internal flooding in this catchment are within 2.5km of a rain gauge.

Historic flooding incidents within the catchment

Norfolk County Council does not hold any records of internal flooding on Church Street, Litcham.

Causes of flooding within the catchment and recommendations

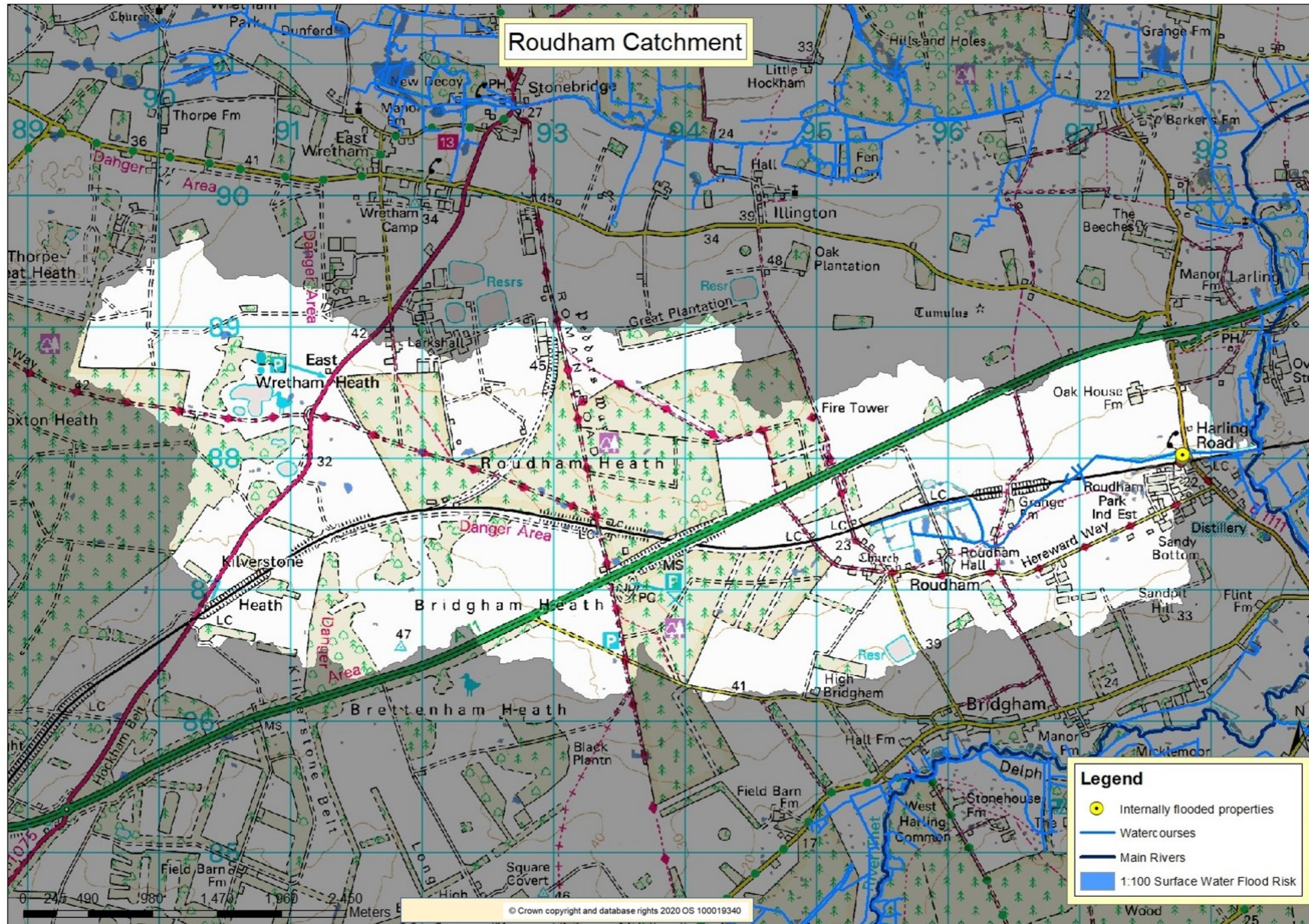
The findings of the investigation are detailed on the following pages. The maps detail the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.



Location	Causes	Recommendations
<p>Church Street - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • 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 property • Run-off from significant rainfall pooled at a low point within the catchment, passing vehicles washed this towards the affected property 	<ul style="list-style-type: none"> • Norfolk County Council will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, this could be achieved through a smallscale improvement scheme to mitigate the risk experienced at this location. It is important to note this recommendation will be subject to the priorities and availability of resources of funders. • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available.

Flooding and flood risk within the Roudham catchment

Map 26



Description of catchment

A small and mostly rural catchment flowing eastwards towards the River Thet.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 year event and the 1 in 100 year event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 year event:	0	0	0
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	0	2	1
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 year event:	0	1	0
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 year event:	0	3	0
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 year event:	0	0	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 year event:	0	0	0

Flood incidents within this catchment

Within this catchment 3 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
16/08/2020	On the 16/08/2020 - 3 properties were internally flooded on Dolphin Terrace, Harling Road Harling. These incidents were reported by: The Fire and Rescue Service via an electronic report on the 17 th August 2020, (FWF/20/2817), (FWF/20/2816) & (FWF/20/2741) Map 27	A resident carried out measures to minimise the impact of flooding during the incident. Norfolk County Council visited affected residents to offer advice and to gather information after the incident.

		The Fire and Rescue Service responded and pumped out during the incident.
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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 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.

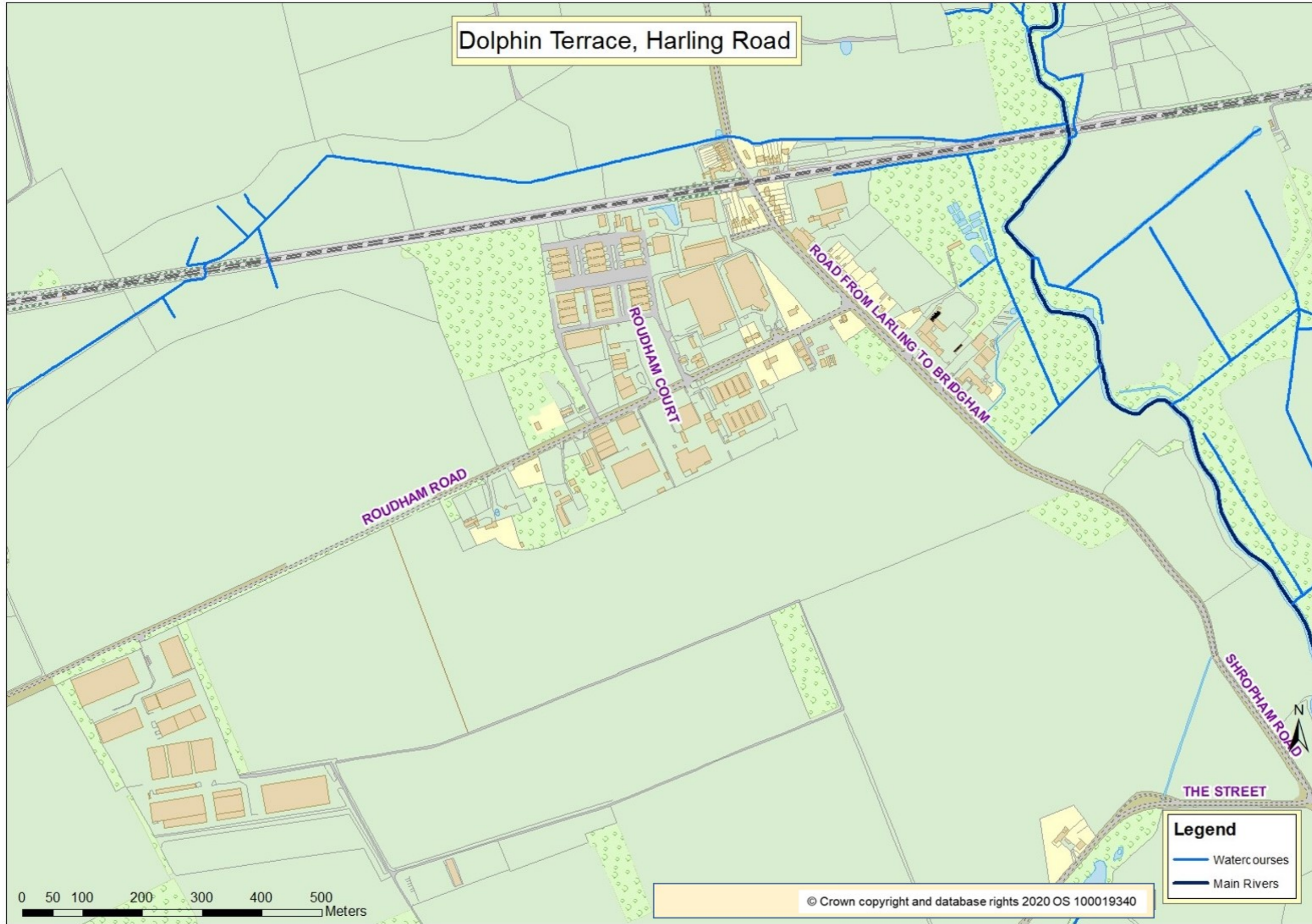
Historic flooding incidents within the catchment

No historic flooding has previously been recorded at these locations.

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.

Dolphin Terrace, Harling Road



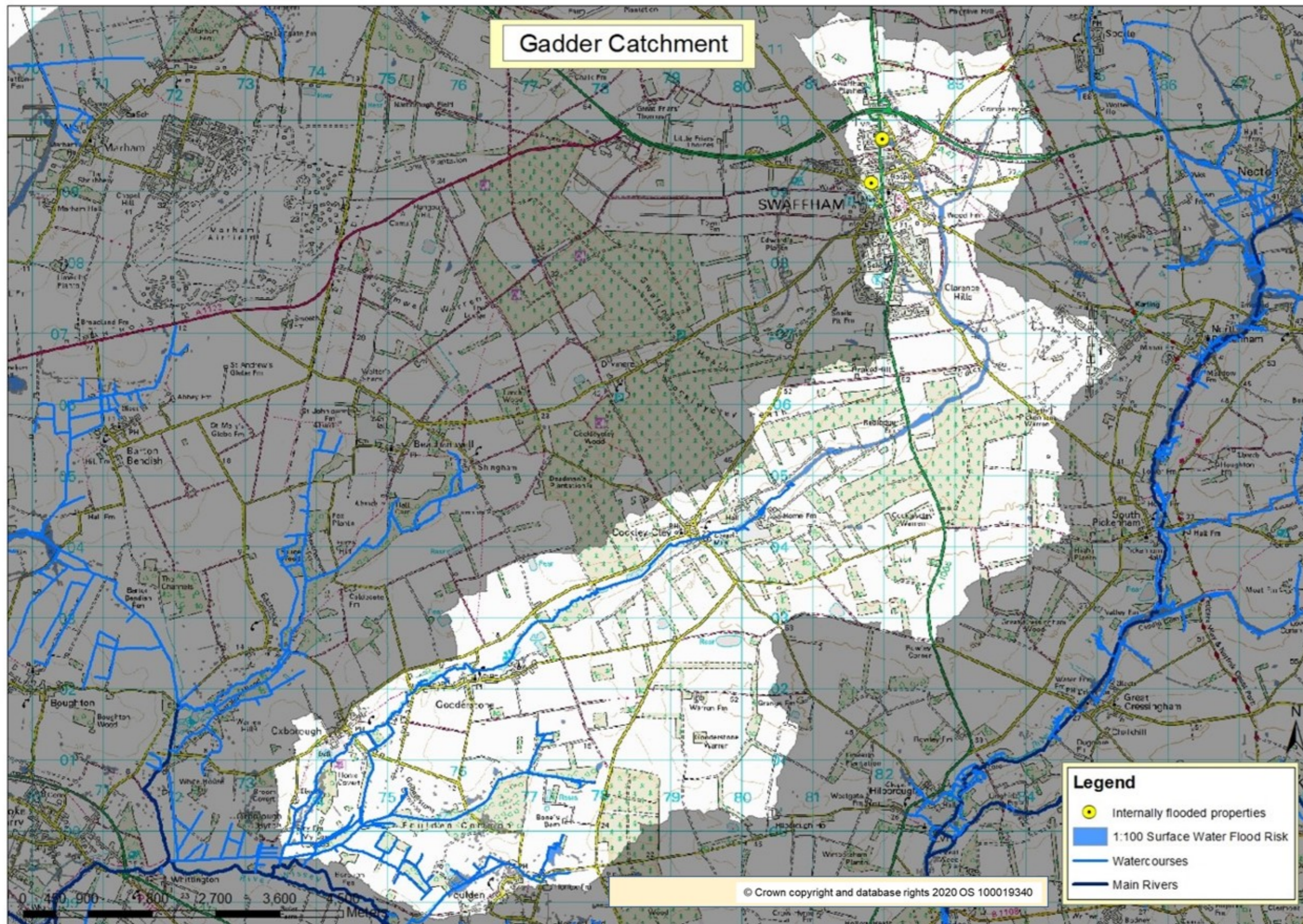
0 50 100 200 300 400 500 Meters

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Legend

- Watercourses
- Main Rivers

Location	Causes	Recommendations
<p>Dolphin Terrace - Report of internal flooding to three properties on the 16th August 2020</p>	<ul style="list-style-type: none"> 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 properties. This was due to a build up of silt and debris reducing capacity in the network. The network overflowed. 	<ul style="list-style-type: none"> Network Rail will determine if works are needed to remove the risk posed by structures that form obstructions to flows and communicate with affected parties and riparian owners. Network Rail will determine an appropriate maintenance regime in line with the risk identified and communicate with affected parties and riparian owners. Norfolk County Council as Lead Local Flood Authority could work with the property owner and adjacent landowners to identify the potential for providing or increasing attenuation to reduce the amount of surface water entering drainage systems. Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council 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.



Description of catchment

The catchment is largely rural except for the town of Swaffham to the North, which flows in a southerly direction.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 year event and the 1 in 100 year event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 year event:	0	142	0
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	0	229	37
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 year event:	0	0	0
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 year event:	0	8	0
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 year event:	0	0	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 year event:	0	0	0

Flood incidents within this catchment

Within this catchment 3 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
16/08/2020	On the 16/08/2020 - 1 property was internally flooded on Ash Close, Swaffham. This incident was reported by: A resident via personal communication on the 4 th September 2020, (2536)	Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.

	Map 29.	
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Castle Acre Road, Swaffham. These incidents were reported by:</p> <p>A resident via an online flood report form on the 15th September 2020, (2588)</p> <p>A resident via an online flood report form on the 7th September 2020, (2586)</p> <p>Map 30</p>	Norfolk County Council (Lead Local Flood Authority) 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 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.

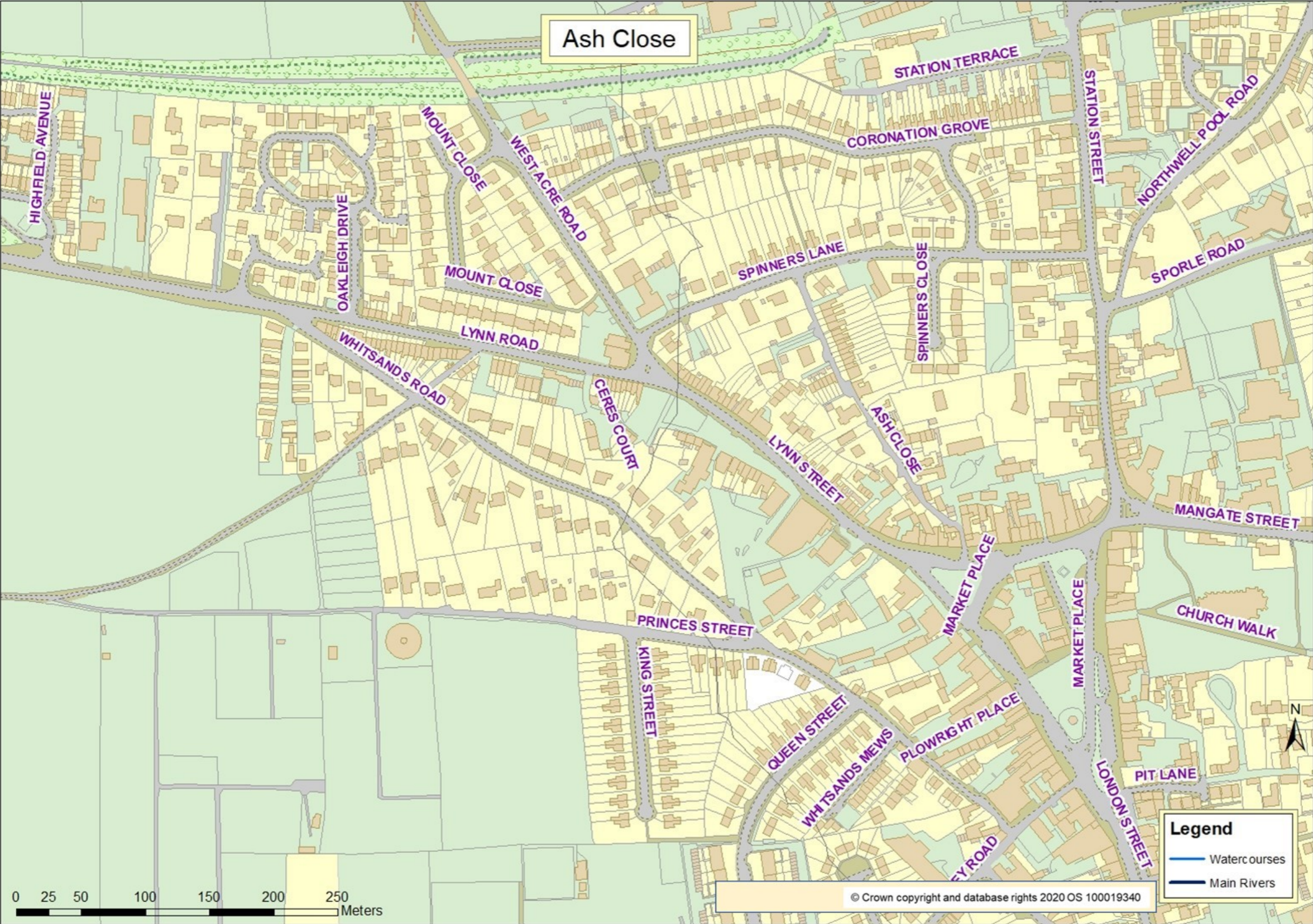
There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

Historic flooding incidents within the catchment

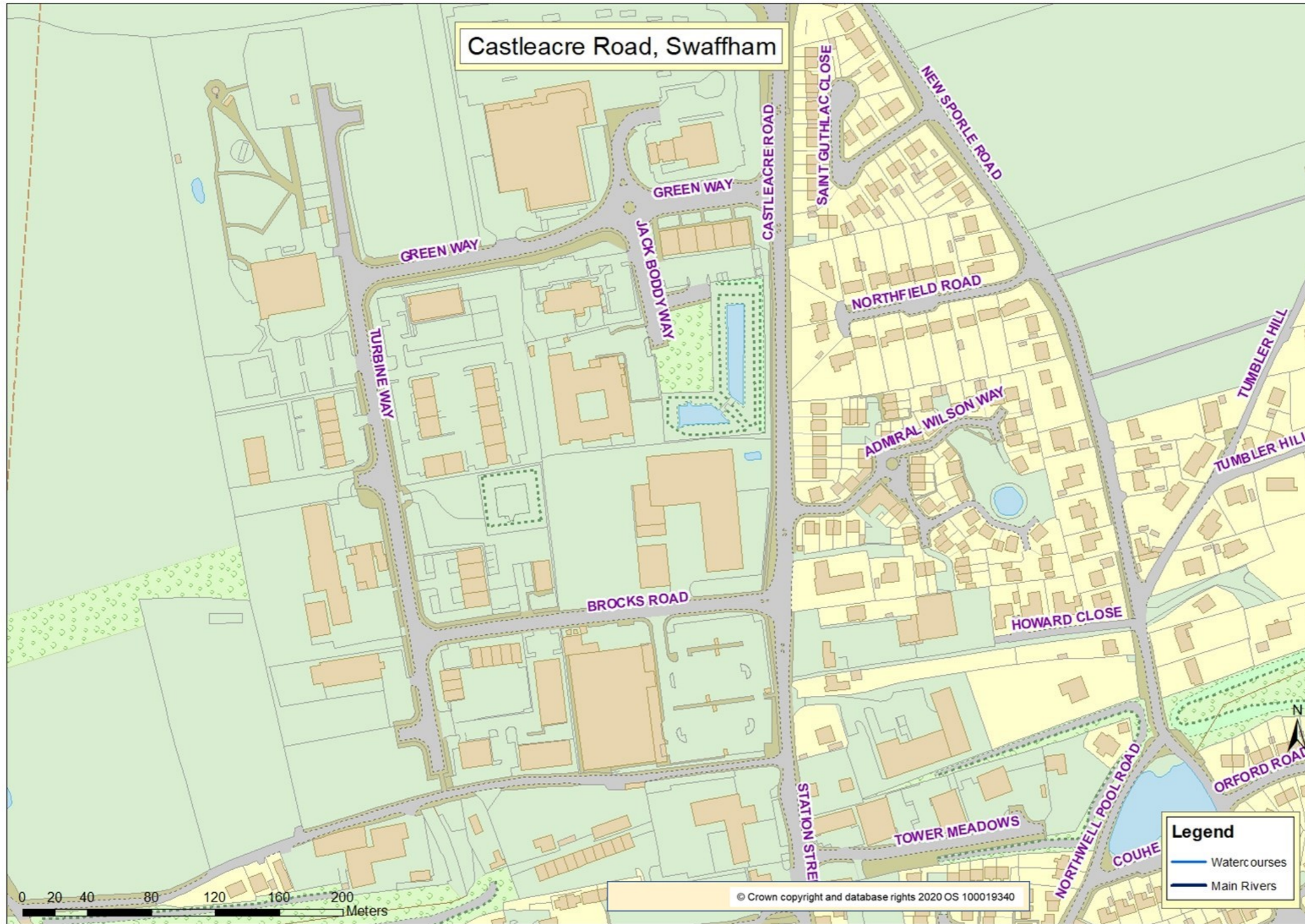
No historic flooding has previously been recorded at these locations.

Causes of flooding within the catchment and recommendations.

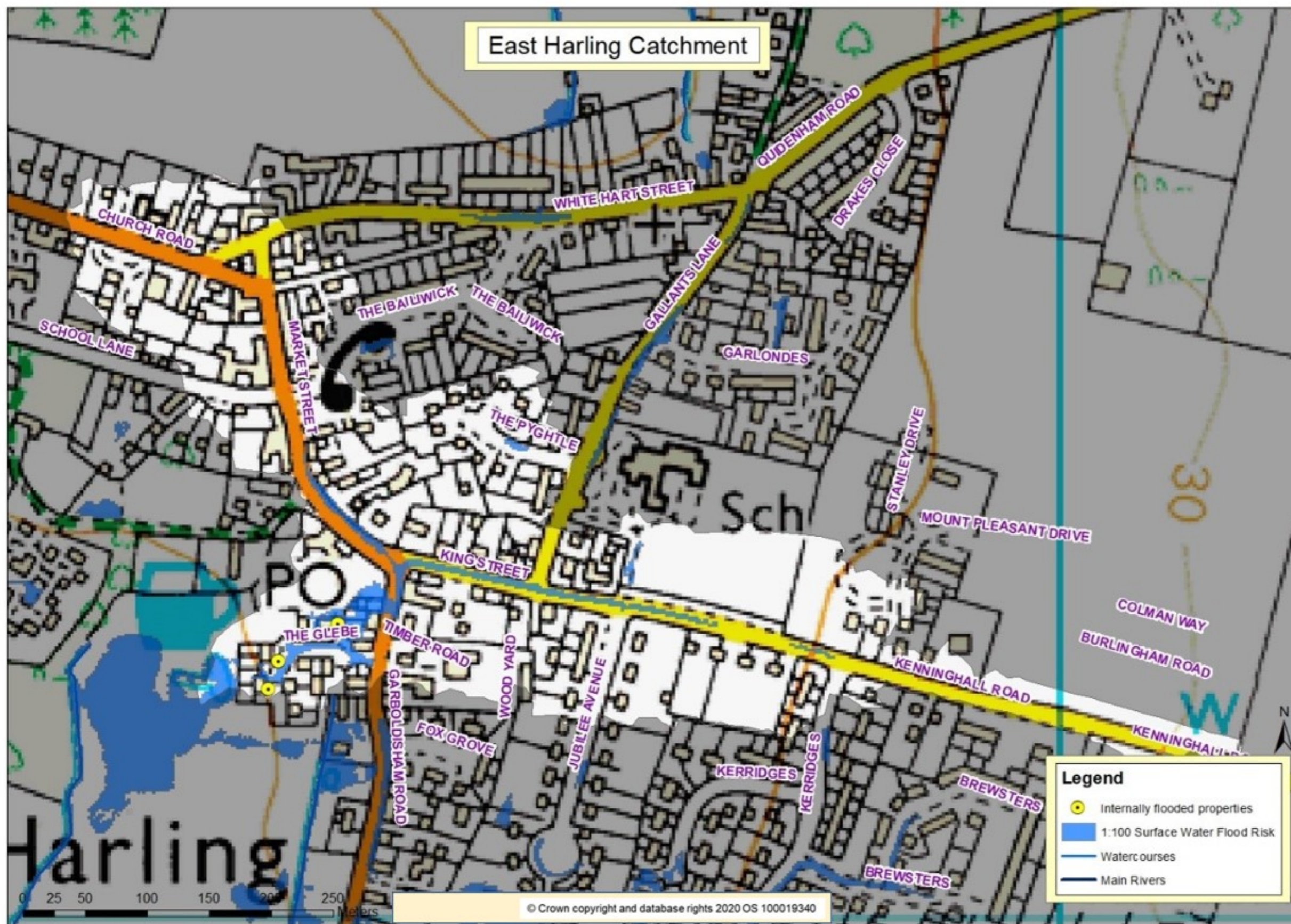
The findings of the investigation are detailed on the following pages. The maps detail the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the flooding. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.



Location	Causes	Recommendations
<p>Ash Close - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> NCC highways should assess whether their system is working to a level required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified.. Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council 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.



Location	Causes	Recommendations
<p>Castleacre Road - Report of internal flooding to two properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from significant rainfall made its way onto the highway and flowed along the road network. It was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded and full of silt. It then flowed onto the accesses of affected properties that were situated lower than these features. 	<ul style="list-style-type: none"> • NCC highways will review the capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified. NCC 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 being undertaken. • Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council 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.



Description of catchment

This is a small urban catchment with a large amount of surface water pooling at the flooded locations.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 year event and the 1 in 100 year event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 year event:	0	3	0
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	0	8	0
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 year event:	0	0	0
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 year event:	0	0	0
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 year event:	0	0	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 year event:	0	0	0

Flood incidents within this catchment

Within this catchment 3 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
16/08/2020	On the 16/08/2020 - 3 properties was internally flooded on The Glebe, Harling. This incident was reported by: The Fire and Rescue Service via an electronic report on the 17 th August 2020, (FWF/20/2591) & (FWF/20/2607).	Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. Fire Service and Rescue visited affected residents to offer advice during the incident.

	<p>A resident via an online flood report form on the 27th August 2020, (2593).</p> <p>Map 32</p>	
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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 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.

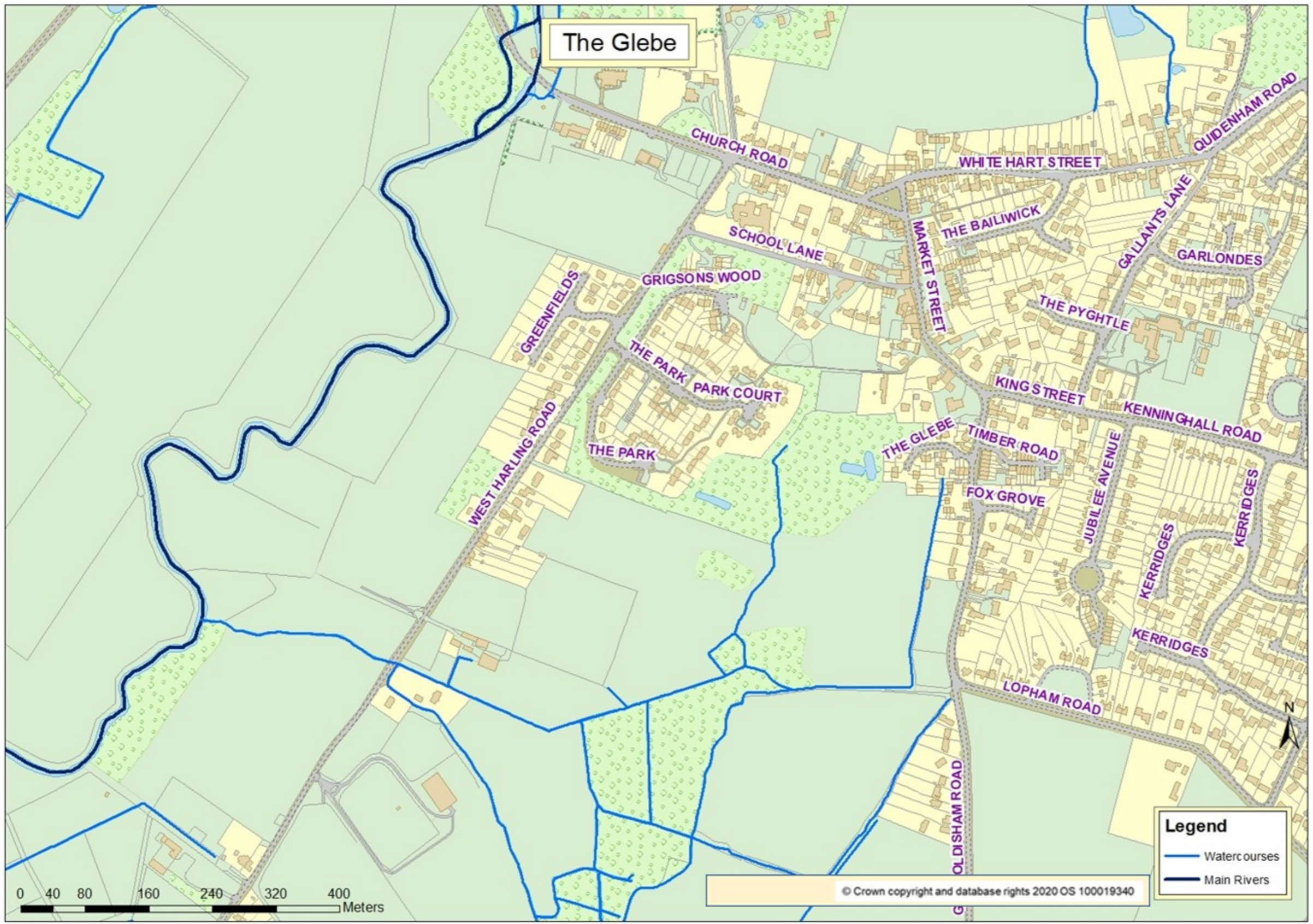
Historic flooding incidents within the catchment

No historic flooding has previously been recorded at this location.

Causes of flooding within the catchment and recommendations.

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.

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Location	Causes	Recommendations
<p>The Glebe - Report of internal flooding to three properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • 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 into the foul drainage network and towards the affected properties. • Run-off from significant rainfall was concentrated along overland flowpaths on which the affected properties are adjacent to. • The flood water entered the properties through the air bricks. 	<ul style="list-style-type: none"> • Property owners should protect their buildings through flood protection measures where appropriate. NCC 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.

Description of catchment

Only one property in this area has been flooded so a catchment map has not been generated.

Flood incidents at Thetford

Within this catchment 1 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
16/08/2020	On the 16/08/2020 - 1 property was internally flooded on Brandon Road, Thetford. This incident was reported by: A resident via an online flood report form on the 17 August 2020, (FWF/20/2497) Map 33.	Norfolk County Council visited the site to gather information after the incident. Norfolk County Council 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 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.

1 of the incidents (100%) of internal flooding in this catchment are within 2.5km of a rain gauge. The rainfall events recorded by gauges for this catchment are;

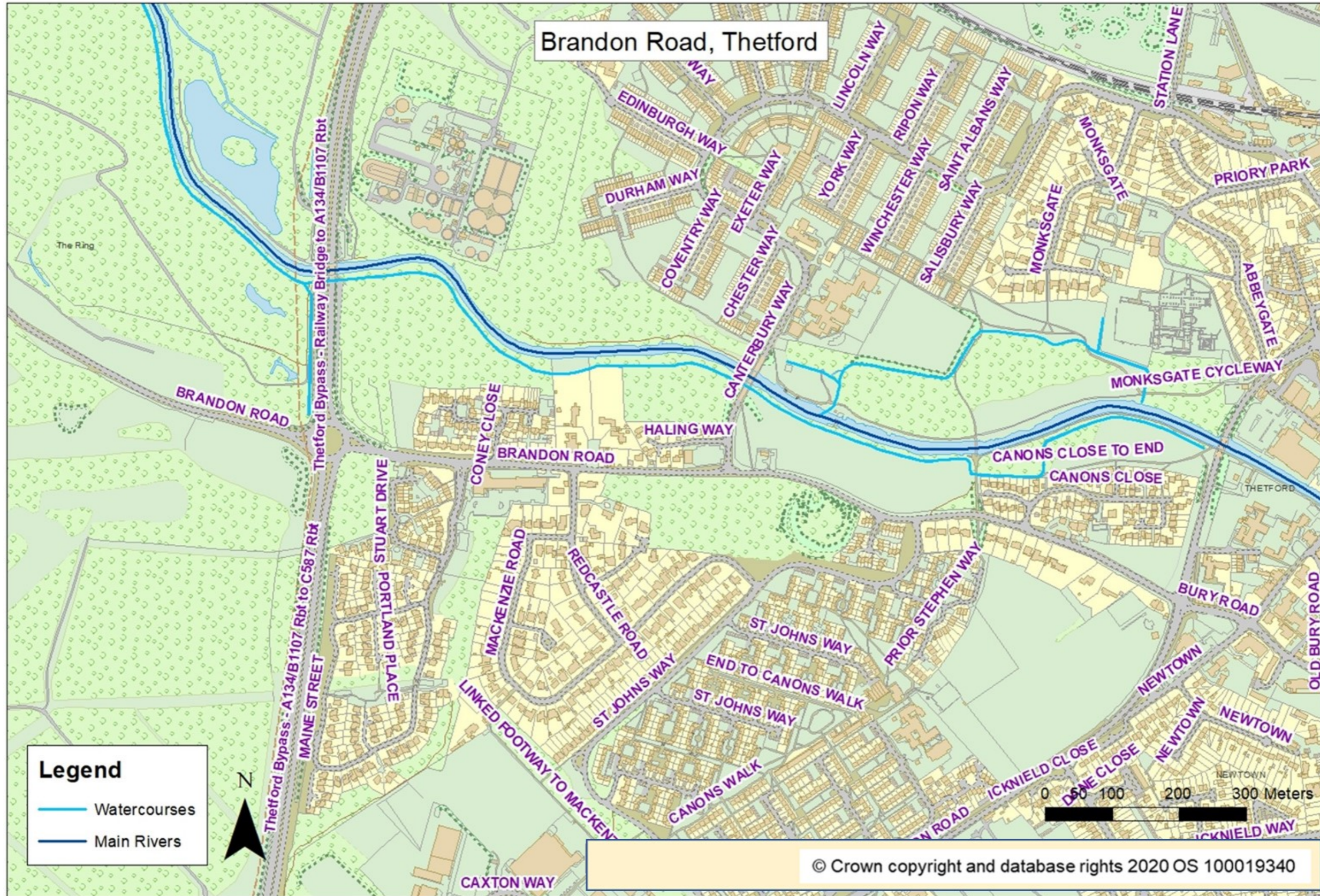
16 August 2020 – 38.2mm rainfall was recorded as falling in 7 hours 15 minutes at the Thetford rainfall monitoring station. This intensity of rainfall for the total duration equates to a 1 in 6 rainfall event which has a 16.7% chance of occurring in any given year.

Historic flooding incidents within the catchment.

There are no records of historic flooding on Brandon Road, Thetford.

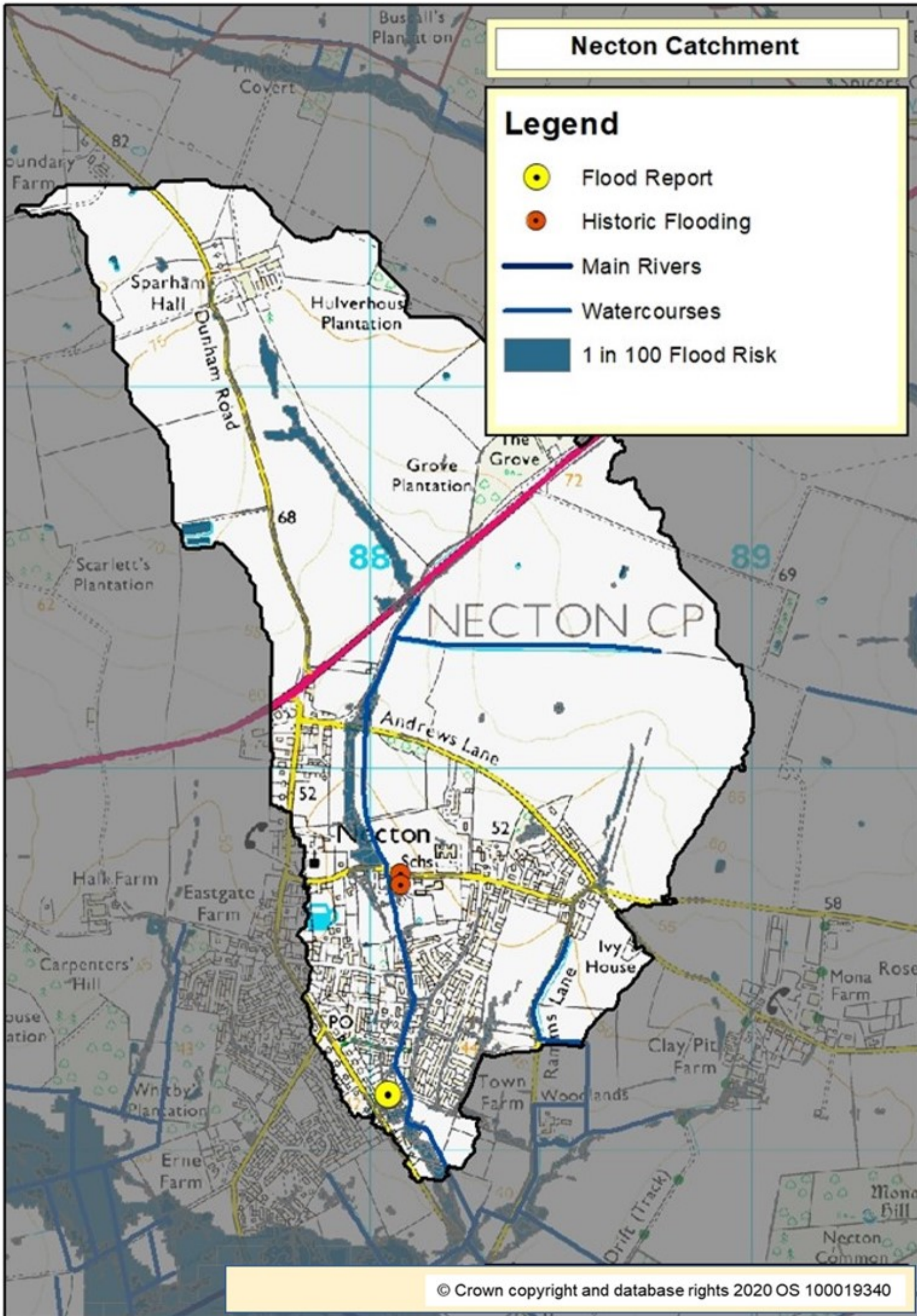
Causes of flooding within the catchment and recommendations.

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.



Location	Causes	Recommendations
Brandon Road - Report of internal flooding to one property on the 16 th August 2020	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • The surface water drainage system was partially obstructed by debris or silt. This reduced the efficiency of the drainage system and contributed to flooding at the affected property. 	<ul style="list-style-type: none"> • NCC will review the capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified.

Map 34



Description of catchment

The Necton catchment runs south from a largely rural northern area through the eastern half of the village before outfalling into the River Wissey. Almost all the properties within Necton are served by private surface water drainage, the majority of which are assumed to be soakaways with some connections to the watercourse. The adopted highway is drained by a pipe network primarily discharging to the watercourse. Anglian Water have 1 section of surface water drainage in Woodward Avenue which discharges to the watercourse at the junction of Mill Street and Watery Lane. Only Anglian Water foul sewers serve the rest of the catchment in Necton.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 event and the 1 in 100 event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 event:	2	17	0
[b] No. of properties subject to surface water flood risk at 1 in 100 event:	3	37	1
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 event:	0	0	0
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 event:	0	0	0
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 event:	0	0	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 event:	0	0	0

Flood incidents within this catchment

Within this catchment 1 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
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16/08/2020	Internal flooding to 1 property and extensive external flooding reported by: The Fire and Rescue Service on Chantry Lane (FWF/20/2602) Map 35	Norfolk County Council and Anglian Water Services Ltd visited affected residents to offer advice and to gather information after the incident. Norfolk County Council carried Anglian Water Services Ltd out surveys to assess the integrity of their drainage systems after the incident.
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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 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 following table lists flooding incidents within the catchment that have been recorded:

Date of incident	Impact	Rainfall intensity
8 th August 2014	2 reports of external flooding on Chantry Lane from foul and surface water sewers and overflowing watercourse. The Fire & Rescue Service, Anglian Water and NCC Highways attended the location.	Unknown
Unknown	Previous flooding mentioned but with no details	Unknown

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following page. The map 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.

Location	Causes	Recommendations
<p>Chantry Lane - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • The surface water drainage system was partially obstructed by debris or silt. This reduced the efficiency of the drainage system and contributed to flooding at the affected property. 	<ul style="list-style-type: none"> • NCC will review the capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified.



Investigation Report into the flooding in North Norfolk on the 16th August 2020

The Upper Sheringham Catchment.

This is a small coastal, catchment with significant overland flow paths at the flooded locations. All affected properties are served by an Anglian Water drainage system.

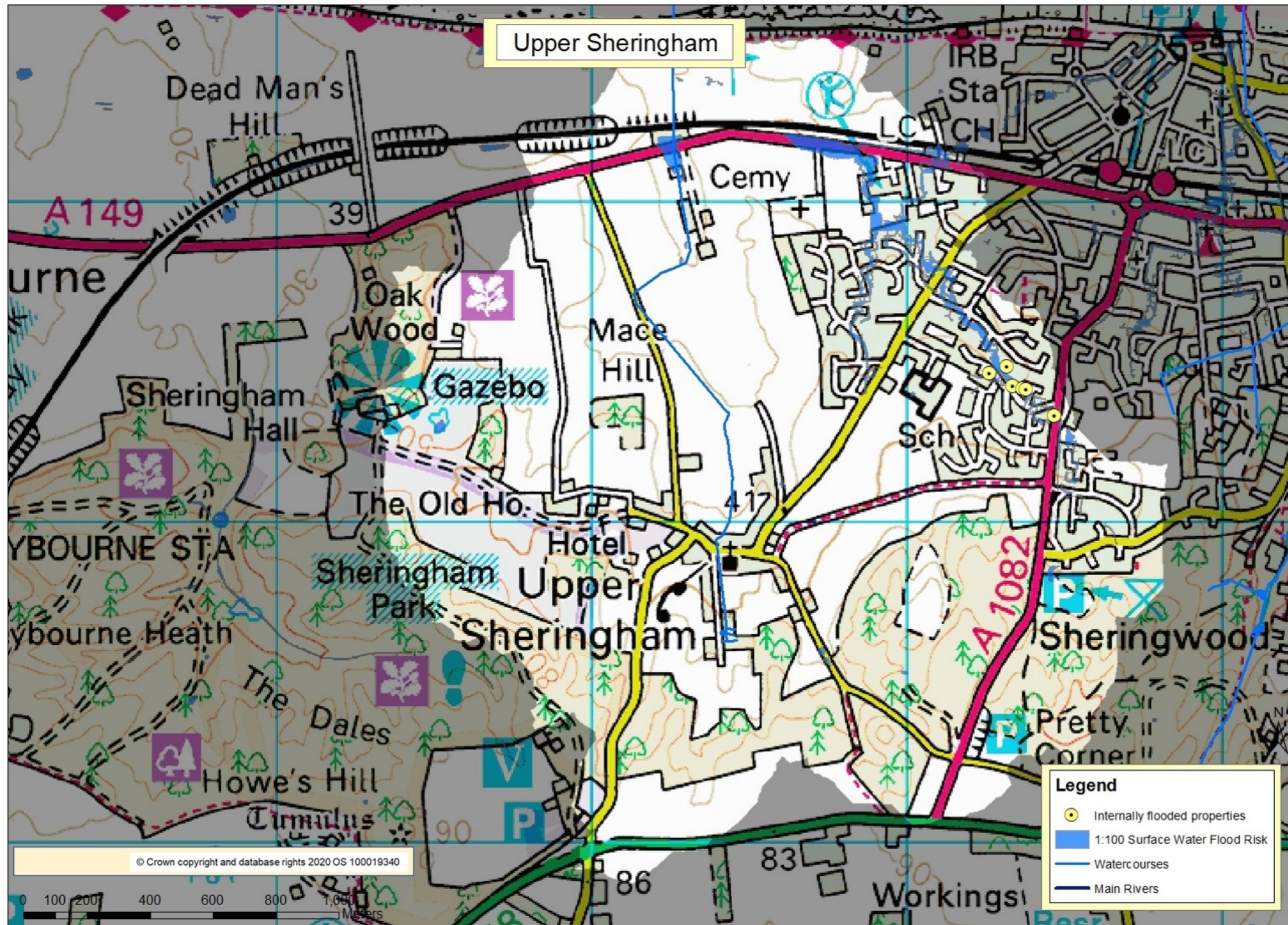
Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 year event and the 1 in 100 year event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 year event:	1	66	3
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	2	146	6
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 year event:	0	0	0
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 year event:	0	0	0
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 year event:	0	0	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 year event:	0	0	0

Flooding and flood risk within the Upper Sheringham catchment

Map 36



Flood incidents within this catchment

Within this catchment 6 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
16/08/2020	<p>On the 16/08/2020 - 3 properties were internally flooded on Lusher Close, Sheringham. These incidents were reported by: A resident via an online flood report form on the 25 August 2020, (2578)</p> <p>A resident via an online flood report form on the 20 August 2020, (2563, 2564)</p> <p>Map 37.</p>	<p>Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.</p> <p>Anglian Water carried out an inspection of their network.</p>
16/08/2020	<p>On the 16/08/2020 - 2 properties were internally flooded on Childs Way, Sheringham. These incidents were reported by: A resident via an online flood report form on the 22nd August 2020, (2555)</p> <p>A resident via personal communication on the 25th September 2020, (2548)</p> <p>Map 37.</p>	<p>Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.</p> <p>Anglian Water carried out an inspection of their network.</p>
16/08/2020	<p>On the 16/08/2020 - 1 property was internally flooded on Uplands Park, Sheringham. This incident was reported by: A resident via personal communication on the 25th September 2020, (2750)</p> <p>Map 37</p>	<p>Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.</p> <p>Anglian Water carried out an inspection of their network.</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 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. However, the Met Office recorded 12.4 mm of rain falling on the 16th August in Cromer (5 miles from Sheringham). 10mm of which fell between midday and 1pm. However, it is likely that localised areas in Sheringham saw a much greater rainfall event as some of the properties that were internally flooded only correlated between the 1 in 100 year and the 1 in 1000 year flood extent mapping. This judgement is supported by the extensive evidence of flooding submitted to the LLFA.

Historic flooding incidents within the catchment

No historic flooding has previously been recorded at these locations.

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.

Location	Causes	Recommendations
<p>Lusher Close, Childs Way & Uplands Park - Report of internal flooding to six properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was concentrated along overland flowpaths on which the affected properties are positioned on or adjacent to. • Surface run-off and silt from a housing development currently under construction made its way onto Holway road. It was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded and full of silt so it overflowed. The run off flowed along the road network and onto the accesses of properties on Childs Way and Lusher Close that were situated lower than the drainage features. The water continued into multiple back gardens of Uplands Park and inside one property. 	<ul style="list-style-type: none"> • Anglian Water and Norfolk County Council (Highways) will review the capacity & level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location 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 being undertaken. • Norfolk County Council will liaise with Local Planning Authorities to encourage better monitoring of surface run off and silt management on new developments during construction. • Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council 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.

Flooding and Flood Risk in Sheringham

Due to the isolated nature of the flooding at the property below a catchment map has not been generated.

Flood incidents within this area

Within this area 1 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
16/08/2020	On the 16/08/2020 - 1 property was internally flooded on Common Lane, Sheringham. This incident was reported by: Norfolk County Council (Highways) via an electronic report on the 25 th August 2020, (2589) Map 38.	Norfolk County Council (Lead Local Flood Authority) Norfolk County Council 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 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

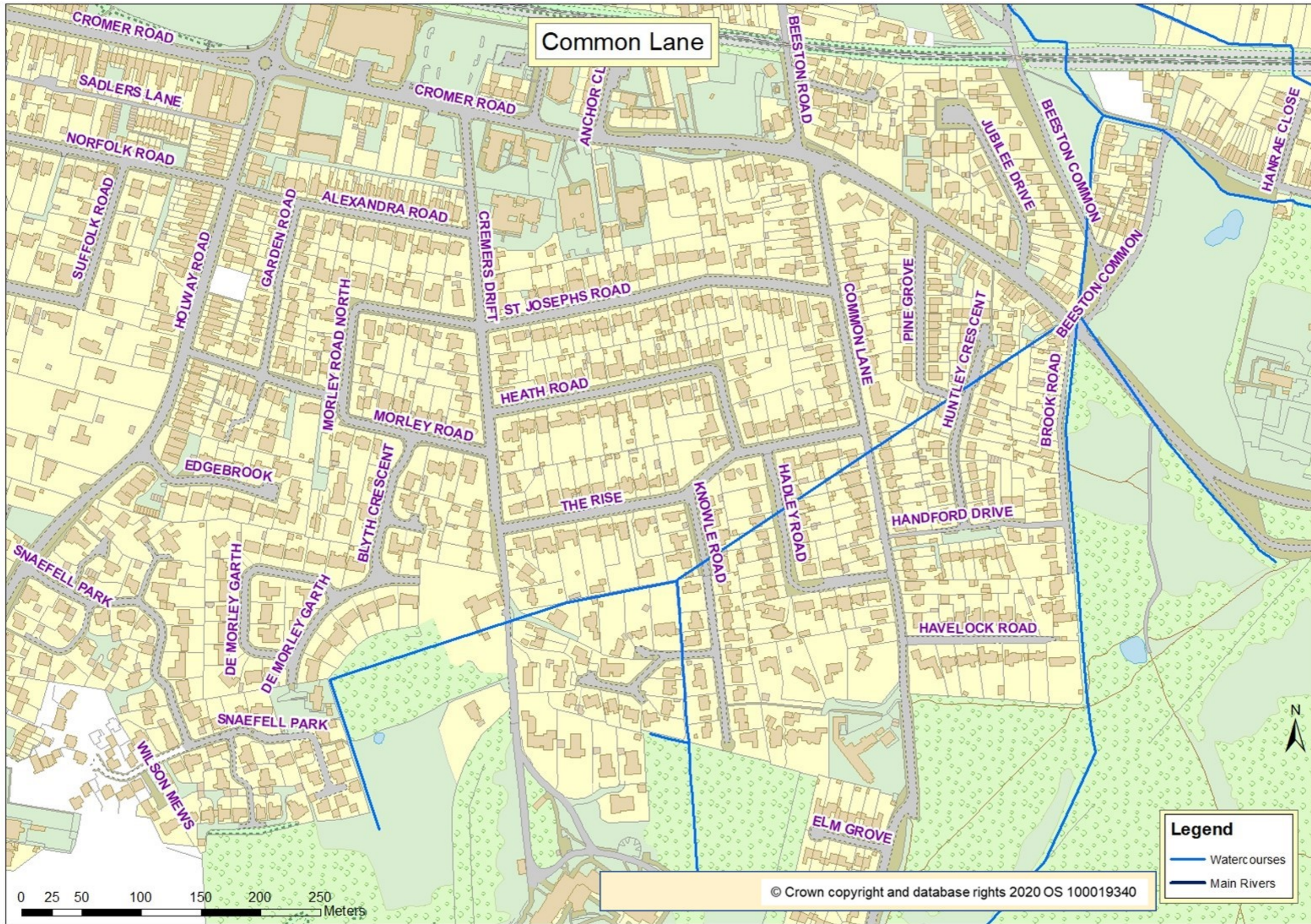
No historic flooding has previously been recorded at these locations.

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced in this catchment

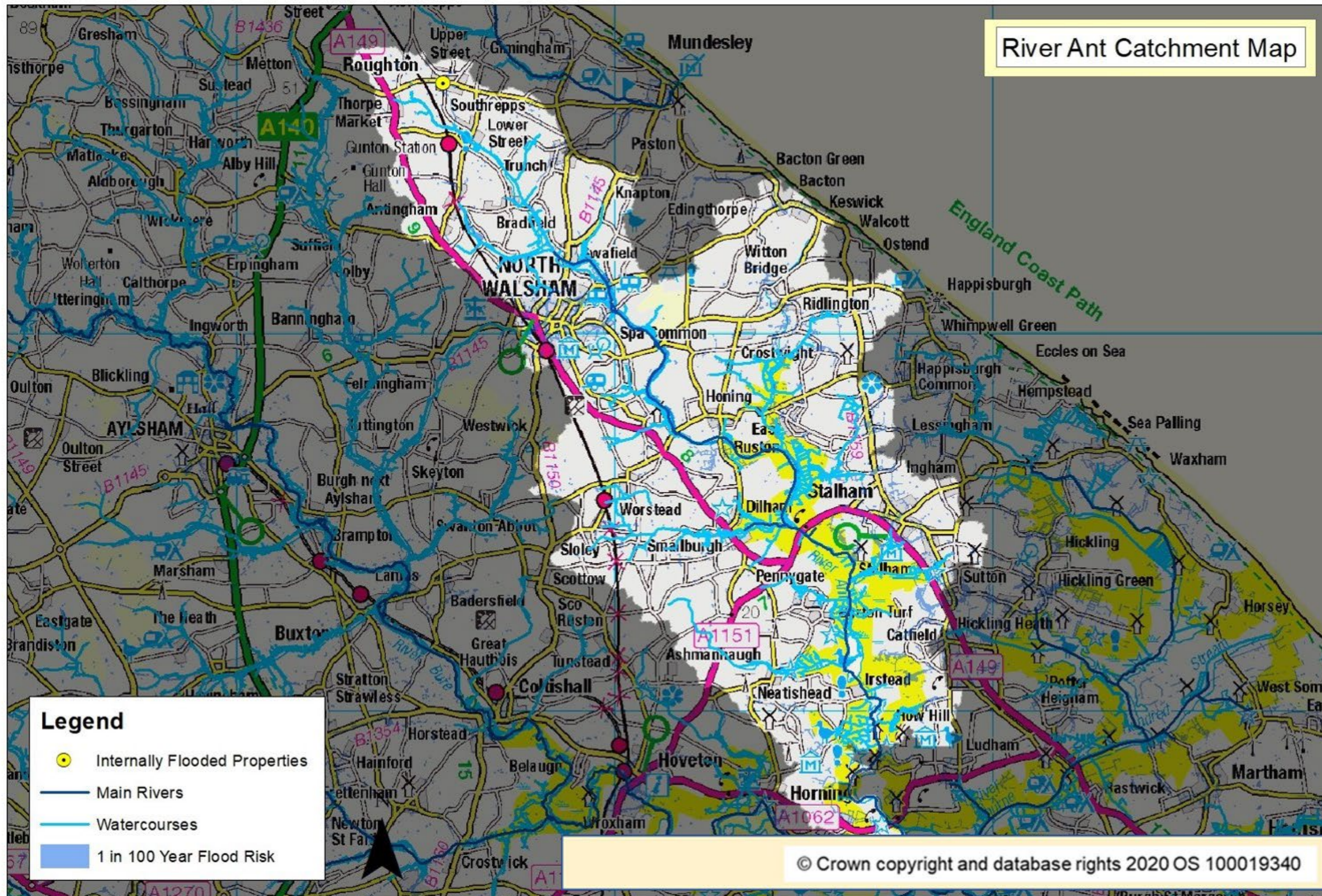
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Location	Causes	Recommendations
<p>Common Lane - Report of internal flooding to six properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from significant rainfall made its way onto the highway and flowed along the road network and onto the accesses of affected properties that were situated lower than these features. 	<ul style="list-style-type: none"> • Norfolk County Council Highways will assess whether any changes can be made to the road to reduce surface flow towards the property. • Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council 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.

Flooding and flood risk within the River Ant catchment

Map 30



Description of the area

Within the River Ant Catchment only two properties were affected and these were both on the High Street, Southrepps. In this area the highway has a series of gullies which take the highway surface water. The village does have an overland flow path running through and there is an area of pooling shown on the Environment Agencies surface water flooding maps which correlates to the flooding experienced at the affected properties.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (fluvial above 3 square km and the sea) of flooding within this catchment has been assessed. The number of properties at risk are set out in the table below for two different risk bandings, the 1 in 30 year event and the 1 in 100 year event. This assessment does not take into account flood risk from groundwater or reservoir failure.

Flood Risk Data Source	Critical Services	Residential	Non-residential
[a] No. of properties subject to surface water flood risk at 1 in 30 year event:	8	271	69
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	14	607	116
[c] No. of properties subject to flood risk from rivers and the sea at 1 in 30 year event:	6	18	14
[d] No. of properties subject to flood risk from rivers and the sea at 1 in 100 year event:	9	50	23
[e] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 30 year event:	0	0	0
[f] No. of properties only subject to both flood risk from surface water and rivers and the sea (combined risk) at 1 in 100 year event:	0	1	1

Flood incidents within this catchment

Within this catchment 2 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
16/08/2020	On the 16/08/2020 - 2 properties were internally flooded on High Street, Southrepps. These incidents were reported by:	Norfolk County Council visited the site to gather information after the incident. A resident carried out measures to minimise the impact of flooding None.

	<p>A resident via an online flood report form on the 17th August 2020, (FWF/20/2500)</p> <p>A resident via an online flood report form on the 17th August 2020, (FWF/20/2490)</p> <p>Map 40.</p>	
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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 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 following table lists flooding incidents within the catchment that have been recorded:

Date of incident	Impact	Rainfall intensity
Unknown	Norfolk County Council does not have any records of historical flooding on the High Street, Southrepps. However, the resident has informed the Flood and Water Management Team that issues with flooding have been ongoing for a number of years and the properties have been internally flooded previously.	Unknown

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.

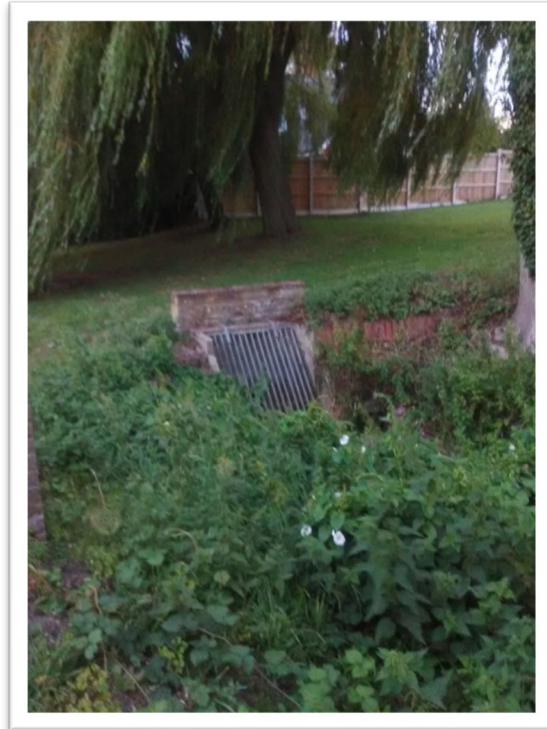
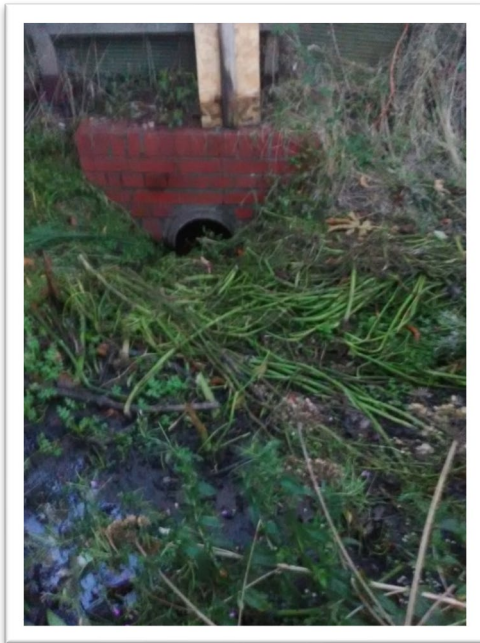


Location	Causes	Recommendations
<p>High Street - Report of internal flooding to two properties on the 16th August 2020</p>	<ul style="list-style-type: none"> • Run-off from significant rainfall was concentrated along overland flow paths on which the properties are situated • Surface run-off flowed along the road network and onto the driveway of the affected properties, it then flowed behind the properties where it pooled at a low point in the catchment and entered the properties through the back doors. 	<ul style="list-style-type: none"> • Norfolk County Council will consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, this could be achieved through a small scale improvement scheme to mitigate the risk experienced at this location. It is important to note this recommendation will be subject to the priorities and availability of resources of funders. • Property owners should protect their buildings through flood protection measures where appropriate.



Norfolk County Council

Investigation Report into the flooding in South Norfolk on the 16th August 2020



Flooding and Flood Risk in Long Stratton

Due to the isolated nature of the flooding at the property below a catchment map has not been generated.

Flood incidents within this area.

Within this catchment 1 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
16/08/2020	On the 16/08/2020 - 1 property was internally flooded on Manor Court, Long Stratton. This incident was reported by: The District Council via a personal communication on the 24 th August 2020, (FWF/20/2567) Map 41	Norfolk County Council visited the site to gather information after the incident. A resident carried out measures to minimise the impact of flooding.

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 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.

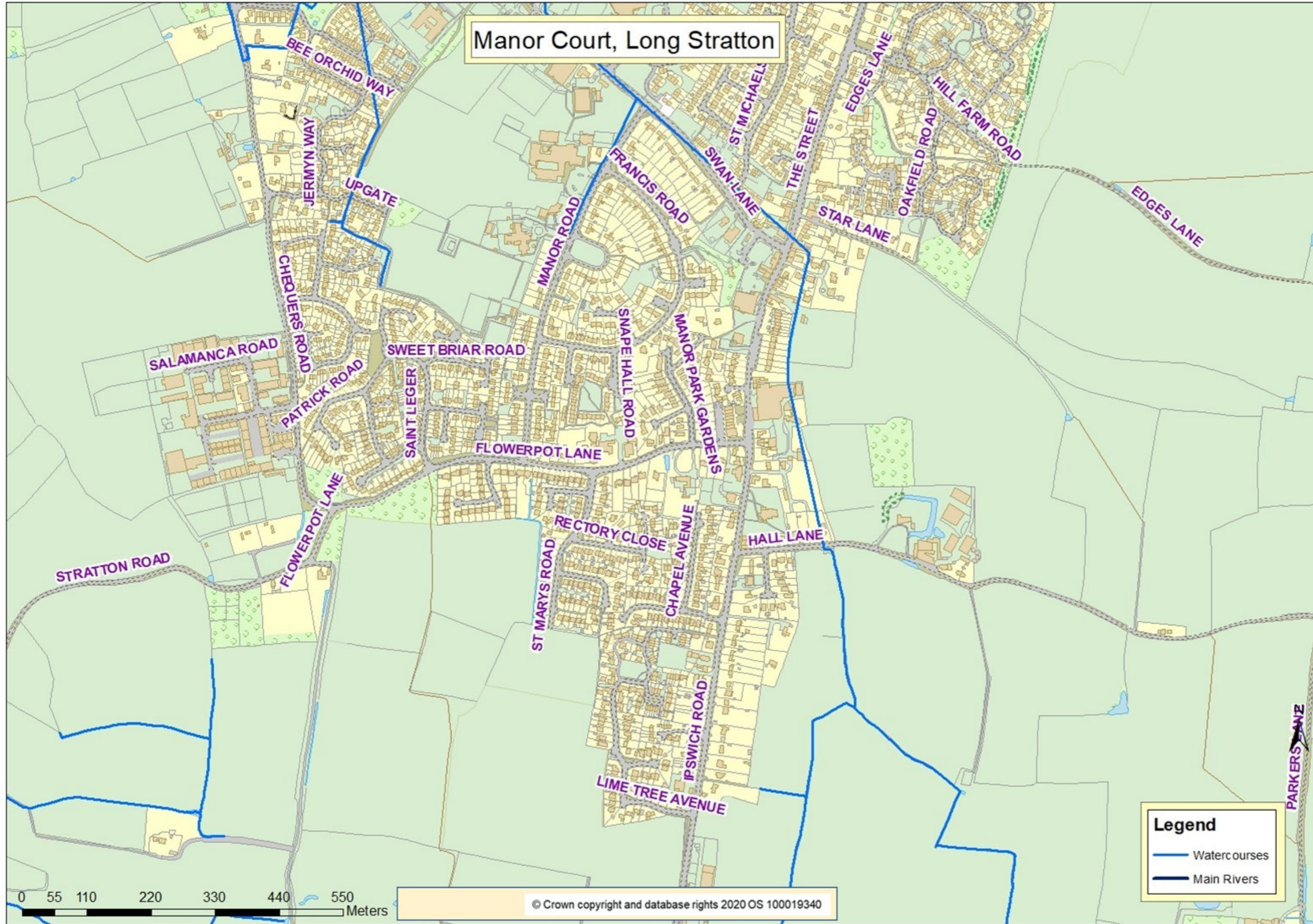
Historic flooding incidents within the catchment

No historic flooding has previously been recorded at these locations.

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.



Location	Causes	Recommendations
<p>Manor Court - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Significant rainfall was directed into the surface water system causing it to surcharge elsewhere. This surcharging contributed to the flooding at the affected property. • An adjacent watercourse was unmaintained and obstructed by debris and vegetation. This reduced the efficiency and overflowed contributing to the accumulation of surface water flood water at the affected property. 	<ul style="list-style-type: none"> • Riparian owners should instigate a regular regime of maintenance to ensure the system is free from obstruction (i.e. tree leaves / roots) at all times. Norfolk County Council will write to riparian owners to remind them of their responsibilities.



Investigation Report into the flooding in King's Lynn and West Norfolk on the 16th August 2020

Flooding and Flood Risk in Castle Acre

One property is confirmed to have flooded in Kings Lynn and West Norfolk on the 16th August, this property is located in Castle Acre. Due to the isolated nature of the flooding at the property below a catchment map has not been generated.

Flood incidents within this area

Within this catchment 2 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
16/08/2020	On the 16/08/2020 - 1 property was internally flooded on Pyes Lane, Castle Acre. This incident was reported by: Norfolk County Council (Highways) via an electronic report on the 21 August 2020, (FWF/20/2540) Map 42.	Norfolk County Council 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 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.

1 of the incidents (100%) of internal flooding in this catchment are within 2.5km of a rain gauge. The rainfall events recorded by gauges for this catchment are;

16 August 2020 – 44mm rainfall was recorded as falling in 3 hours 15 minutes at the Castle Acre rainfall monitoring station. This intensity of rainfall for the total duration equates to a 1 in 13 rainfall event which has a 7.7% chance of occurring in any given year.

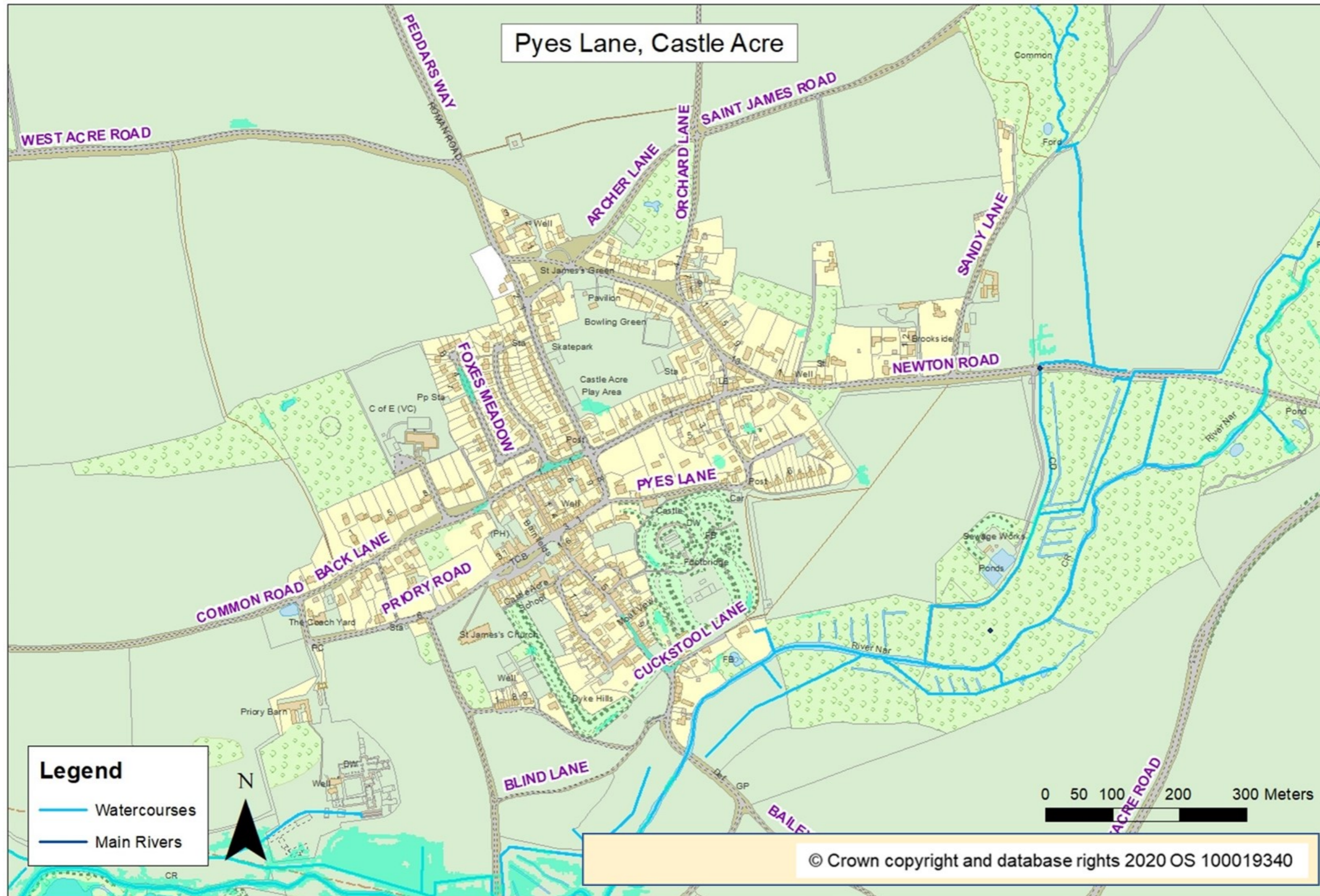
Historic flooding incidents within the catchment

The following table lists flooding incidents within the catchment that have been recorded at these locations.

Date of incident	Impact	Rainfall intensity
May 2014 and June 2015	The Flood and Water Management Team have records of internal flooding to a property on Pyes Lane on the 18 th May 2014 and 20 th June 2015. However, the resident has reported being internally flooded multiple times including three times throughout 2020.	Unknown

Causes of flooding within the catchment and recommendations

The findings of the investigation are detailed on the following pages. The maps detail 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. The maps also set out recommendations to mitigate the causes and impacts of the flooding experienced within this catchment.



Location	Causes	Recommendations
<p>Pyes Lane - Report of internal flooding to one property on the 16th August 2020</p>	<ul style="list-style-type: none"> • Surface run-off from rainfall flowed along the road network and onto the accesses of affected property which sits below the level of the road and pools around the property. • The surface water drainage system was fully obstructed by debris and silt. • The flood water entered the property through low thresholds. 	<ul style="list-style-type: none"> • NCC 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. • NCC should undertake maintenance on the soakaway located on Pyes Lane • Property owners should protect their buildings through flood protection measures where appropriate. NCC will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.

Disclaimer

Although every effort has been taken to ensure the accuracy of the information contained within the pages of the report, we cannot guarantee 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/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;

- Basements and below ground level floors are included.
- Garages are included if in the fabric of the building. Garages adjacent or separate from the main building are not included.
- 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 runoff, groundwater and ordinary watercourses.

- 'Surface runoff' 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.
- 'Groundwater' means all water which is below the surface of the ground and in direct contact with the ground or subsoil.
- '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.

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)

- Duty to investigate significant flooding from any source.
- Duty to maintain a register of structures or features which affect flood risk from all sources.

- Power to undertake works to manage flood risk from surface run-off and groundwater.
- Powers to regulate activities on ordinary watercourses outside of Internal Drainage Board areas.
- Duties as a Category 1 Responder for Emergency Planning and the Fire & Rescue Service.

2. District Councils

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

3. Internal Drainage Boards (“IDBs”)

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

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

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

- Undertake cost beneficial capital schemes to alleviate or eliminate flooding where the flood event is associated with a failure of their assets.
- Duty to provide, improve, maintain and operate systems of public sewers and works for the purpose of effectually draining an area.
- Are responsible for flooding from their foul, combined and surface water sewers, and from burst water mains.
- 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.
- 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.

- Duties as a Category 2 Responder for Emergency Planning.

6. Riparian Owners

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