Norfolk County Council

Investigation Report into the flooding in South Norfolk between 2013 - 2016

Report Reference: FIR036

Report prepared by Abygail Hadley on 2 July 2019

Executive Summary

(a) Flooding incidents and causes

Flooding occurred in South Norfolk on numerous dates from 2013 – 2016. 32 properties are reported to have experience internal flooding during this time period. For the purpose of this report and ease of presentation we have set out the report based on areas in which the incidents were located. A summary of the 34 incidents affected in each area can be found below:

- Shotesham: 1 internal
- Hempnall: 1 internal
- Easton: 2 internal
- New Costessey: 1 internal
- Wymondham: 2 internal
- Poringland West: 4 internal
- Poringland East: 3 internal
- Surlingham and Rockland St Mary: 2 internal
- Mundham: 1 internal
- Ditchingham Dam: 1 internal
- Harleston: 4 internal
- Winfarthing: 3 internal
- Hethersett: 1 internal
- Scole: 6 internal

(b) Flooding causes

The flooding incidents covered within this report are from across a large area. Mainly these areas are rural settlements that are surrounded by agricultural land, exceptions include New Costessey and Wymondham.

Key trends seen throughout the report are:

- Properties were sitting along an overland flow path on which rainfall was concentrated
- The drainage system near the affected properties was partially or fully obstructed reducing its efficiency
- Surface run-off from rainfall made its way on to private tracks/roads/highway and flowed towards the affected properties which sat below these features
- Drainage of individual properties was unmaintained and could not cope with the heavy rainfall/ Drainage at individual properties was partially or fully obstructed reducing its efficiency and contributing to the flooding.
- The development of new properties has increased the risk of flooding at existing properties through lack of sufficient drainage or lack of drainage maintenance
- That drainage systems are not designed to cope with a significant event and in such cases were exceeded

(c) Key recommendations

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.
- Planning authorities should review conditions to ensure that new developments mitigate risk elsewhere at the construction phase.

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 resilience 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

Norfolk County Council should;

- Work with partner organisations to identify funding for flood mitigation. This would include assessing the potential to install property level resilience measures, reduce run-off and increase the attenuation of flood water to reduce the impacts of flooding.
- Work with property owners to consider opportunities to route flood water on the highway away from 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
- 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.

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.

Please note that an addendum has been published to provide an update on subsequent actions taken following the initial response of Risk Management Authorities and individuals to the flood event as detailed within this report. This addendum can be found at the following link.

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 boardly.
- 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 South Norfolk Various in 2013 - 2016 as:

- multiple residential properties were internally flooded.
- one commercial property was internally flooded.
- multiple critical services installations were affected by flooding.

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.

Reports of Flooding in South Norfolk (2014 - 2016)

Easton

New Costessey

Hethersett

Wymondham

Surlingham and Rockland St Mary

Poringland West

Poringland East

Shotesham

Mundham

Hempnall

Ditchingham Dam

Winfarthing and Burston

Harleston

Scole

Legend

Report of Flooding

Flooding in the Shotesham Area

Description of the area

Shotesham sits at a low point within the area with a main river running through it. The village is located within in a rural area. The area either side of the river is characterised by a 1 in 30 flood risk, few properties sit within this area.

Flood incidents within this area

Within this catchment 2 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
20/11/2014	On the 20/11/2014 - 1 property was internally flooded on The Street, Shotesham. This incident was reported by a resident via a telephone call on the 24 November 2014, (FWF/14/7/1113)	Norfolk County Council (Lead Local Flood Authority) 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.

Flooding on The Street

Location: **Shotesham**

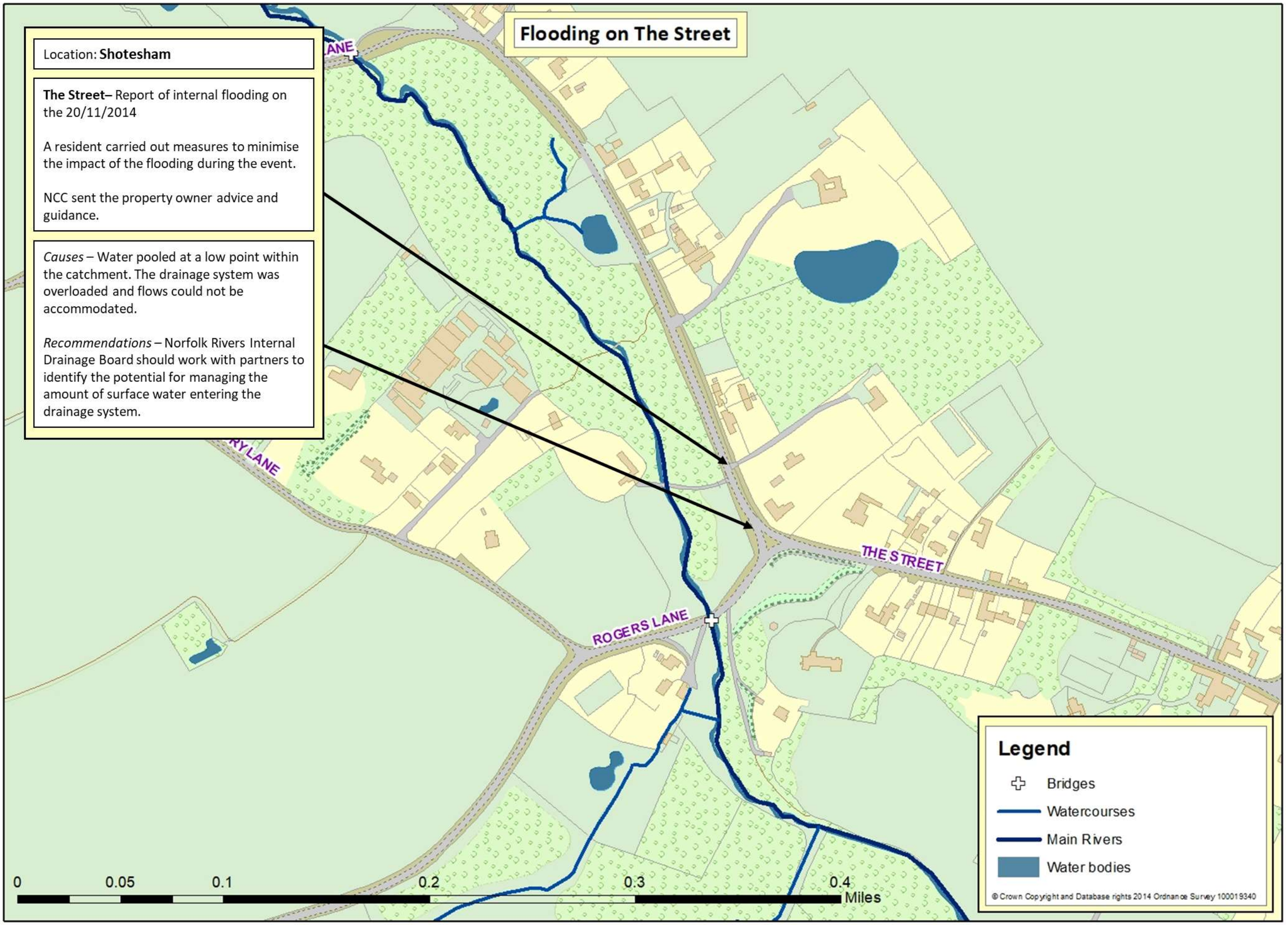
The Street– Report of internal flooding on the 20/11/2014

A resident carried out measures to minimise the impact of the flooding during the event.

NCC sent the property owner advice and guidance.

Causes – Water pooled at a low point within the catchment. The drainage system was overloaded and flows could not be accommodated.

Recommendations – Norfolk Rivers Internal Drainage Board should work with partners to identify the potential for managing the amount of surface water entering the drainage system.



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 on The Street, Shotesham

Recorded reports of flooding:

Date of incident	Impact	Rainfall intensity
12/07/2017	Report of external flooding	Unknown

Flooding in the Hempnall Area

Description of the area

Hempnall is located at a high point in the area. An ordinary watercourse runs parallel to the village around half a mile to the West. Another watercourse can be found a similar distance to the East of the village. The village is primarily surrounded by agricultural land.

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
02/07/2016	On the 02/07/2016 - 1 property was internally flooded on Alburgh Road, Hempnall. This incident was reported by Norfolk County Council via email correspondence on the 27 July 2016, (FWF/16/7/2988)	The Fire and Rescue Service visited affected residents to offer advice and to gather information during the incident. The Highways Authority 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.

Flooding on Alburgh Road

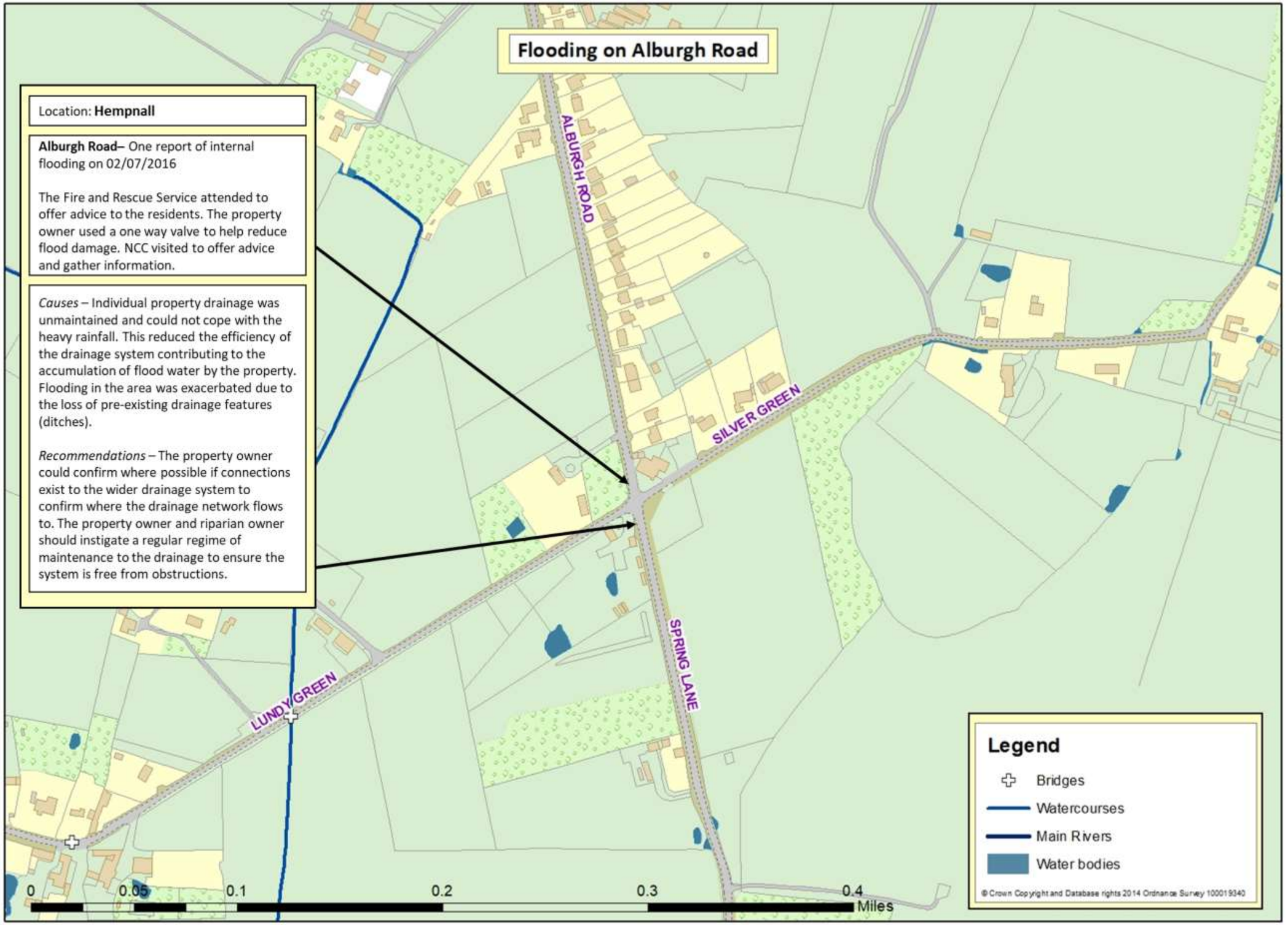
Location: **Hempnall**

Alburgh Road– One report of internal flooding on 02/07/2016

The Fire and Rescue Service attended to offer advice to the residents. The property owner used a one way valve to help reduce flood damage. NCC visited to offer advice and gather information.

Causes – Individual property drainage was unmaintained and could not cope with the heavy rainfall. This reduced the efficiency of the drainage system contributing to the accumulation of flood water by the property. Flooding in the area was exacerbated due to the loss of pre-existing drainage features (ditches).

Recommendations – The property owner could confirm where possible if connections exist to the wider drainage system to confirm where the drainage network flows to. The property owner and riparian owner should instigate a regular regime of maintenance to the drainage to ensure the system is free from obstructions.



Recent rainfall within the catchment

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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 on Alburgh Road, Hempnall

Recorded reports of flooding:

Date of incident	Impact	Rainfall intensity
04/08/2014	Report of external flooding from ditch behind property	Unknown
09/10/2014	Report of external flooding from ditch adjacent to property	Unknown
14/06/2017	Report of external flooding from ditch behind property	Unknown

Flooding in the Easton Area

Description of the area

Easton sits at a high point in the area with flow paths running from the village to the North, East and South. Surface run-off is directed away from the village along these flow paths. To the south of the village is agricultural land and to the north is a wooded area which sits parallel to the A47.

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
11/10/2014	On the 11/10/2014 - 1 property was internally flooded on Marlingford Road, Easton. This incident was reported by a resident via an online flood report form on the 16 October 2014, (FWF/7/0912)	Norfolk County Council carried out maintenance work to the highway drainage system after the incident.
10/07/2014	On the 10/07/2014 - 1 property was internally flooded on Marlingford Road, Easton. This incident was reported by Norfolk County Council (Highways) via email correspondence on the 11 July 2014, (FWF/14/7/0902)	Norfolk County Council assessed the capacity of their drainage system after the incident. NCC carried out maintenance work to the highway drainage system after the incident to clear it of blockages.

Flooding on Marlingford Road

Location: **Easton**

Marlingford Road– Report of internal flooding on the 11/07/2014 and 10/07/2014

NCC removed silt and debris from the gullies on Marlingford Road following the incident to reduce the risk of future flooding.

Marlingford Road

Causes – The surface water drainage system was partially blocked by debris or silt reducing the efficiency of the drainage system. The surface water flowed on to the highway where it flowed towards the properties which are situated below the road features.

Recommendations – NCC will consider opportunities to route flood water on the highway away from the affected properties. NCC will review the level of maintenance required to sustain drainage efficiency.

Please see the addendum for actions carried out since the incident.

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RINGLAND LANE
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Easton to the A.1074 Longwater Ichge, Norwich - End slip on to Churc
CHURCH LANE
PEACOCK CLOSE
PEGG CLOSE
DEREHAM ROAD
ST PETERS DRIVE
KENNEDY CLOSE
WOOD VIEW ROAD
JOHN HOWES CLOSE
MARLINGFORD WA
WOOD VIEW ROAD
WHEELER CRESCENT
BUXTON CLOSE
MARLINGFORD ROAD
HALL ROA

N

0 0.05 0.1 0.2 0.3 0.4 Miles

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies

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 on Marlingford Road

There are no historic records of flooding on these roads.

Flooding in the New Costessey Area

Description of the area

New Costessey is an urban area located to the North West of Norwich. The area sits on a gradient which slopes northwards. There are a number of flow paths that run through the area to the North which outlets into the River Tudd.

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
23/06/2016	On the 23/06/2016 - 1 property was internally flooded on Norwich Road, Costessey. This incident was reported by the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/7/3276)	A resident responded and pumped out during the incident. The Fire and Rescue Service responded and pumped out during the incident. Anglian Water Services Ltd visited the property following the incident to offer advice and collect evidence and reduce the impact of flooding.

Flooding on Norwich Road

Location: **New Costessey**

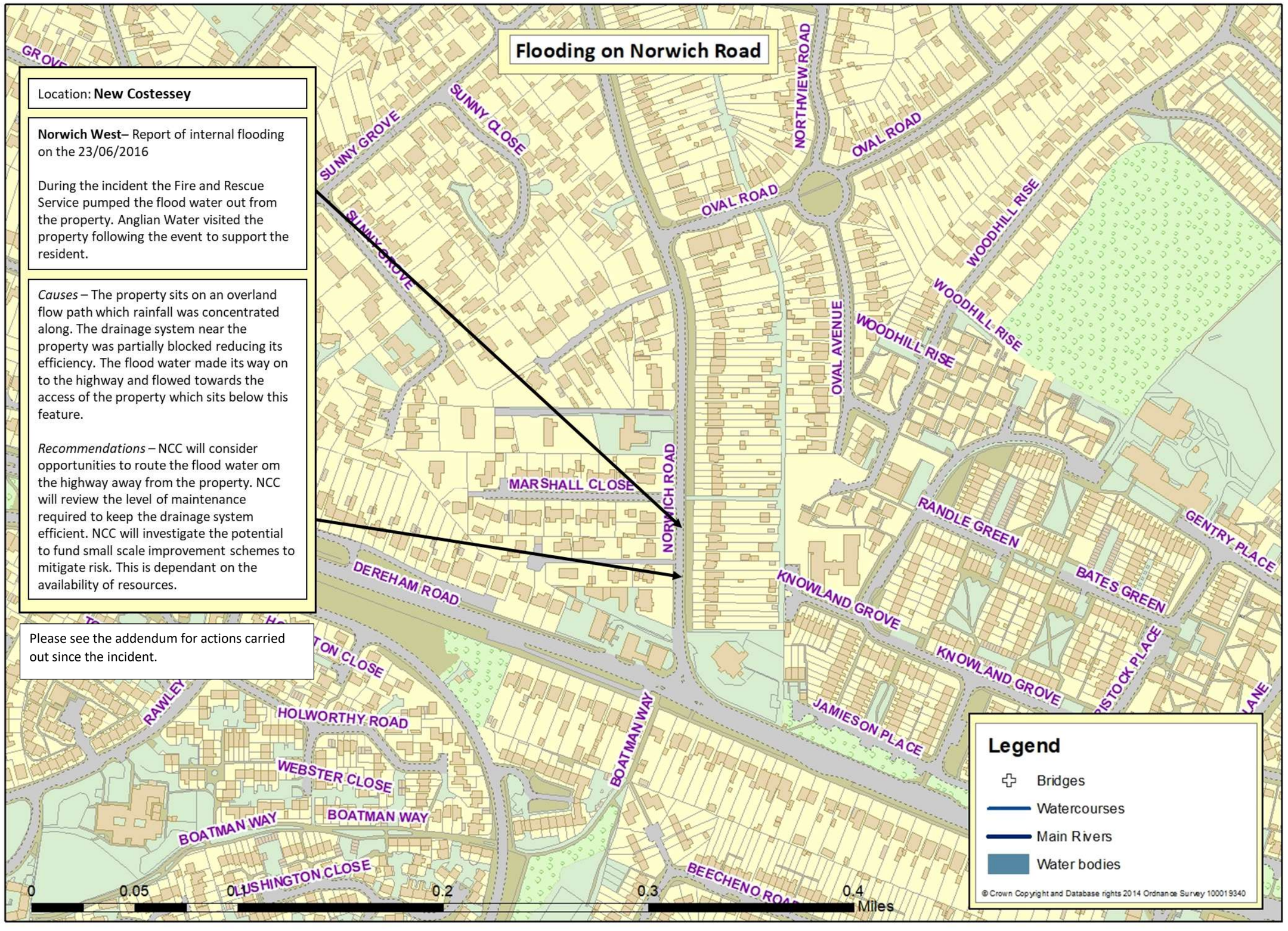
Norwich West– Report of internal flooding on the 23/06/2016

During the incident the Fire and Rescue Service pumped the flood water out from the property. Anglian Water visited the property following the event to support the resident.

Causes – The property sits on an overland flow path which rainfall was concentrated along. The drainage system near the property was partially blocked reducing its efficiency. The flood water made its way on to the highway and flowed towards the access of the property which sits below this feature.

Recommendations – NCC will consider opportunities to route the flood water om the highway away from the property. NCC will review the level of maintenance required to keep the drainage system efficient. NCC will investigate the potential to fund small scale improvement schemes to mitigate risk. This is dependant on the availability of resources.

Please see the addendum for actions carried out since 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;

23 June 2016 - 30mm rainfall was recorded as falling in 1 hours 30 minutes at the Norwich Heigham rainfall monitoring station. This intensity of rainfall for the total duration equates to a 1:24 rainfall event.

Historic flooding incidents on Norwich Road, New Costessey

There are no records of historic flooding on this road.

Flooding and flood risk within the Wymondham catchment

Description of the area

This area compromises mainly of residential and industrial area. Surface water flows mainly from north to south in the area towards the River Tiffey. The Northern most area of the town sits at the highest point and run-off flows northwards from this area to ordinary watercourses.

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
16/09/2016	On the 16/09/2016 - 1 property was internally flooded on Ketts Avenue, Wymondham. This incident was reported by Norfolk County Council (Lead Local Flood Authority) via email correspondence on the 5 December 2016, (FWF/16/7/3330)	Norfolk County Council visited affected residents to offer advice and to gather information after the incident. Anglian Water Services Ltd visited affected residents to offer advice and to gather information after the incident.
12/07/2016	On the 12/07/2016 - 1 property was internally flooded on Spinks Lane, Wymondham. This incident was reported by Norfolk County Council (Lead Local Flood Authority) via email correspondence on the 13 July 2016, (FWF/16/7/3053)	A resident carried out measures to minimise the impact of flooding during the incident. Norfolk County Council visited affected area to gather information after the incident. South Norfolk District Council took steps to minimise the impact of future flooding.

Flooding on Spinks Lane

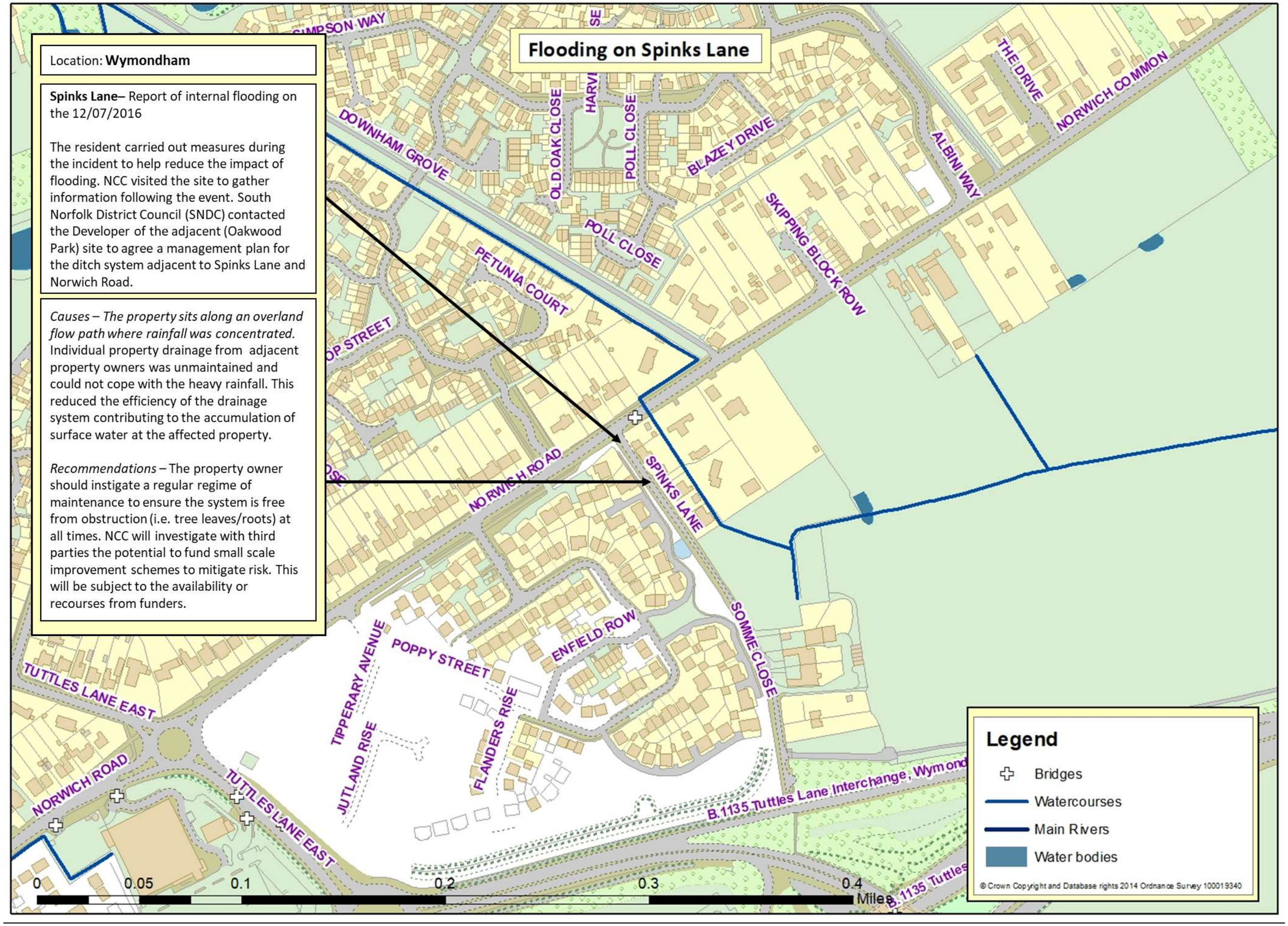
Location: **Wymondham**

Spinks Lane– Report of internal flooding on the 12/07/2016

The resident carried out measures during the incident to help reduce the impact of flooding. NCC visited the site to gather information following the event. South Norfolk District Council (SNDC) contacted the Developer of the adjacent (Oakwood Park) site to agree a management plan for the ditch system adjacent to Spinks Lane and Norwich Road.

Causes – The property sits along an overland flow path where rainfall was concentrated. Individual property drainage from adjacent property owners was unmaintained and could not cope with the heavy rainfall. This reduced the efficiency of the drainage system contributing to the accumulation of surface water at the affected property.

Recommendations – The property owner should instigate a regular regime of maintenance to ensure the system is free from obstruction (i.e. tree leaves/roots) at all times. NCC will investigate with third parties the potential to fund small scale improvement schemes to mitigate risk. This will be subject to the availability or recourses from funders.



Flooding on Ketts Avenue

Please see the addendum for actions carried out since the incident.

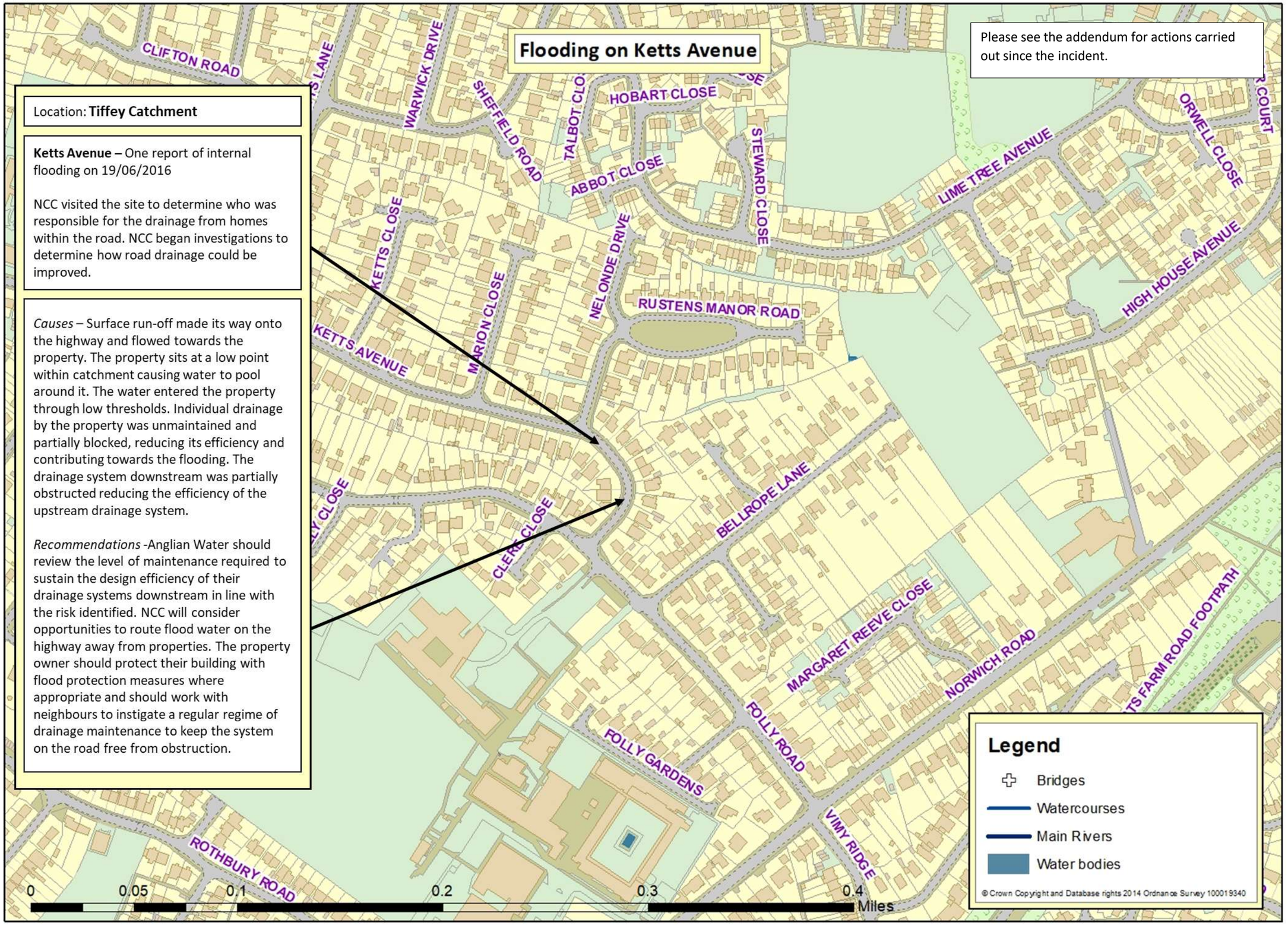
Location: **Tiffey Catchment**

Ketts Avenue – One report of internal flooding on 19/06/2016

NCC visited the site to determine who was responsible for the drainage from homes within the road. NCC began investigations to determine how road drainage could be improved.

Causes – Surface run-off made its way onto the highway and flowed towards the property. The property sits at a low point within catchment causing water to pool around it. The water entered the property through low thresholds. Individual drainage by the property was unmaintained and partially blocked, reducing its efficiency and contributing towards the flooding. The drainage system downstream was partially obstructed reducing the efficiency of the upstream drainage system.

Recommendations -Anglian Water should review the level of maintenance required to sustain the design efficiency of their drainage systems downstream in line with the risk identified. NCC will consider opportunities to route flood water on the highway away from properties. The property owner should protect their building with flood protection measures where appropriate and should work with neighbours to instigate a regular regime of drainage maintenance to keep the system on the road free from obstruction.



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.

2 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;

11 June 2016 - 30mm rainfall was recorded as falling in 1 hours 45 minutes at the Harleston STW rainfall monitoring station. 26.5mm of this was in a 45 minute period, this intensity of rainfall for the duration equates to a 1:15 rainfall event.

12 July 2016 – Although this property does not sit within 2.5km of a rain gauge data from the Met Office shows that there was heavy showers in the East of England on this date. With 47mm of rainfall being recorded as having fallen in Lingwood (Norfolk)[1]. Multiple reports of flooding were received for South Norfolk on this date, further suggesting that heavy localised rainfall was experienced on this date.

Historic flooding incidents on Ketts Avenue, Wymodnham

On a number of occasions there has been flooding in Ketts Avenue. NCC has the following two incidents on record:

Date of incident	Impact	Rainfall intensity
01/12/2016	Report of internal flooding	Unknown
06/07/2017	Report of internal flooding	1 in 5 year event

Flooding on Spinks Lane

Record from South Norfolk District Council show that flooding was experienced on Spinks Lane on the following dates:

- 13/06/2016 – 6.2 mm of rainfall is recorded as falling throughout the day at Harleston STW rainfall monitoring station
- 23/06/2016 – 31.8 mm of rainfall is recorded as falling throughout the day at Harleston STW rainfall monitoring station
- 10/07/2017 – 0.8 mm of rainfall is recorded as falling throughout the day at Harleston STW rainfall monitoring station

[1] Met Office (2016) UK Climate Summaries – July 2016
https://www.metoffice.gov.uk/climate/uk/summaries/2016/july

Flooding and flood risk within Poringland West

Description of the area

This is a small settlement located just to the North West of Poringland. The settlement sits at a high elevation for the region and surface water flows away from the settlement to the west towards the River Tas and to the east towards ordinary water courses.

Flood incidents within this catchment

Within this catchment three 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
19/11/2016	On the 19/11/2016 - 1 property was internally flooded on Caistor Lane, Caister St Edmund. This incident was reported by the Fire and Rescue Service via an electronic report on the 24 November 2016, (FWF/16/7/3847)	The Fire and Rescue Service responded and pumped out after the incident.
12/10/2016	On the 12/10/2016 - 1 property was internally flooded on Oaklands, Framingham Earl. This incident was reported by South Norfolk District Council via email correspondence on the 13 October 2016, (FWF/16/7/3590)	Norfolk County Council and Anglian Water visited affected residents to gather information after the incident.
07/01/2016	On the 07/01/2016 - 1 property was internally flooded on Norwich Road, Poringland. This incident was reported by a resident via email correspondence on the 16 June 2016, (FWF/16/7/2775)	Norfolk County Council (Highways) carried out maintenance work to the highway drainage system after the incident. The landowner assessed the capacity of their drainage system after the incident. South Norfolk District Council visited affected residents to offer advice and to gather information after the incident. 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 after the incident.

Flooding on Caistor Lane

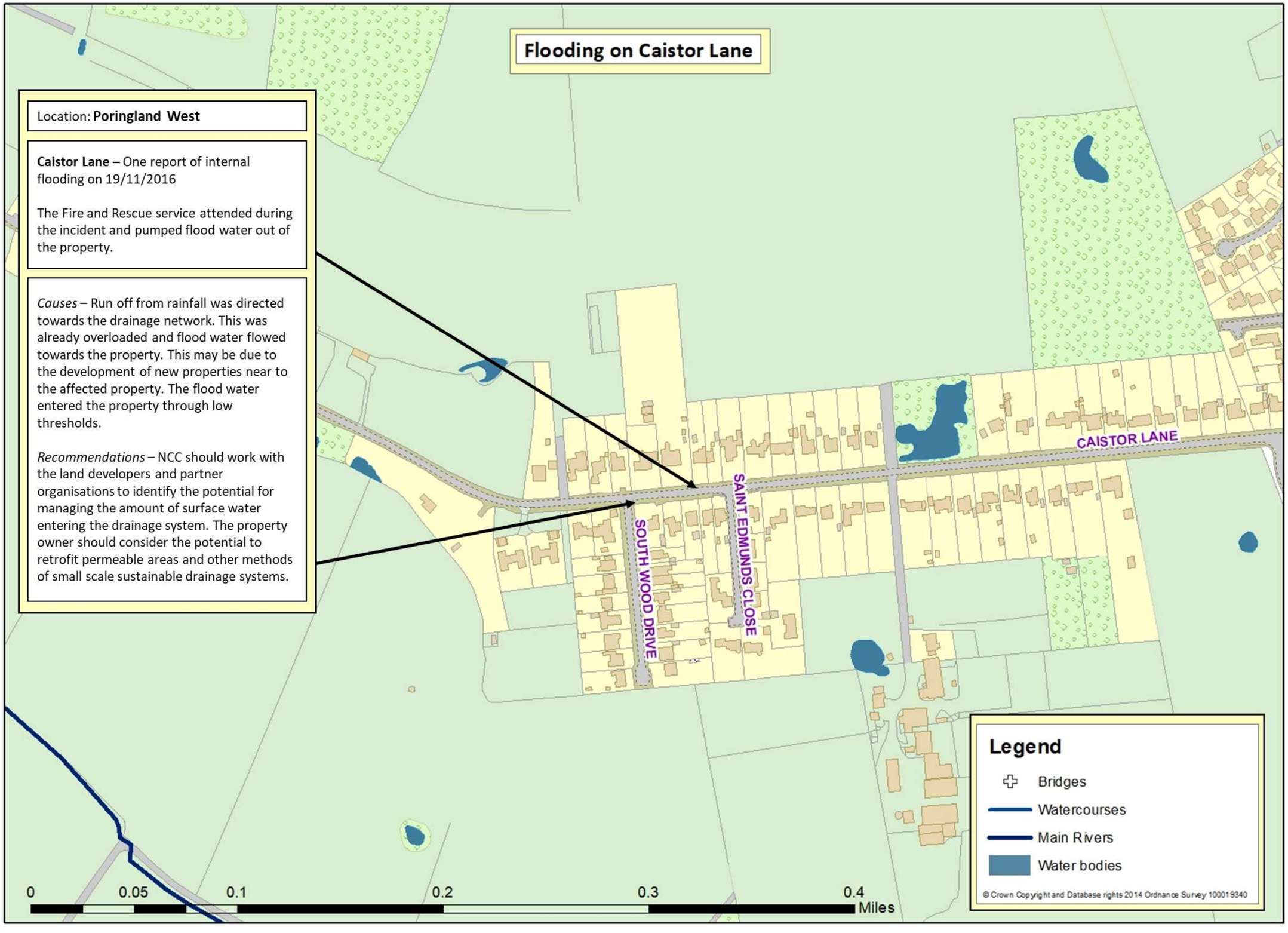
Location: **Poringland West**

Caistor Lane – One report of internal flooding on 19/11/2016

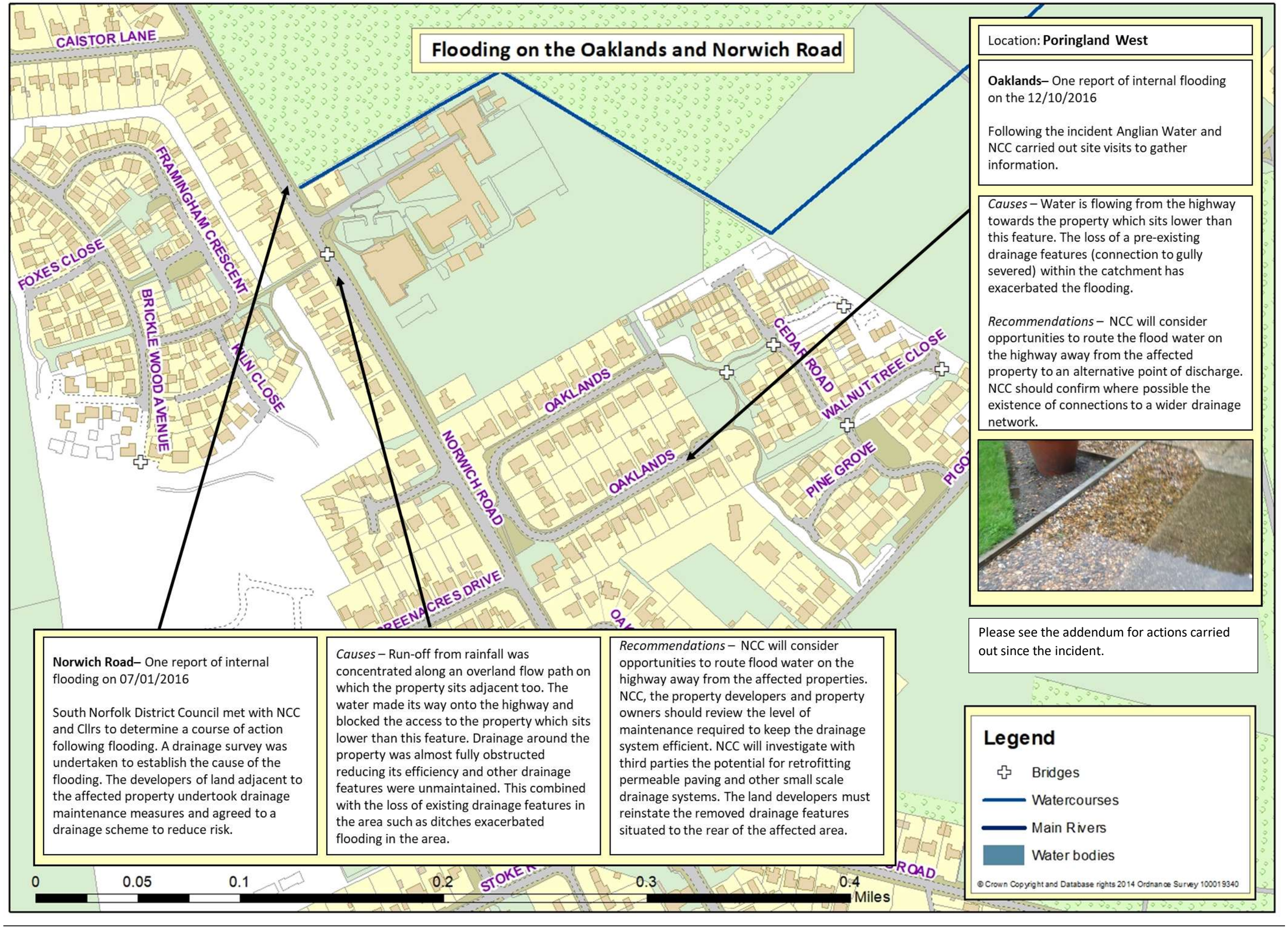
The Fire and Rescue service attended during the incident and pumped flood water out of the property.

Causes – Run off from rainfall was directed towards the drainage network. This was already overloaded and flood water flowed towards the property. This may be due to the development of new properties near to the affected property. The flood water entered the property through low thresholds.

Recommendations – NCC should work with the land developers and partner organisations to identify the potential for managing the amount of surface water entering the drainage system. The property owner should consider the potential to retrofit permeable areas and other methods of small scale sustainable drainage systems.



Flooding on the Oaklands and Norwich Road



Location: **Poringland West**

Oaklands– One report of internal flooding on the 12/10/2016

Following the incident Anglian Water and NCC carried out site visits to gather information.

Causes – Water is flowing from the highway towards the property which sits lower than this feature. The loss of a pre-existing drainage features (connection to gully severed) within the catchment has exacerbated the flooding.

Recommendations – NCC will consider opportunities to route the flood water on the highway away from the affected property to an alternative point of discharge. NCC should confirm where possible the existence of connections to a wider drainage network.

Please see the addendum for actions carried out since the incident.

Norwich Road– One report of internal flooding on 07/01/2016

South Norfolk District Council met with NCC and Cllrs to determine a course of action following flooding. A drainage survey was undertaken to establish the cause of the flooding. The developers of land adjacent to the affected property undertook drainage maintenance measures and agreed to a drainage scheme to reduce risk.

Causes – Run-off from rainfall was concentrated along an overland flow path on which the property sits adjacent too. The water made its way onto the highway and blocked the access to the property which sits lower than this feature. Drainage around the property was almost fully obstructed reducing its efficiency and other drainage features were unmaintained. This combined with the loss of existing drainage features in the area such as ditches exacerbated flooding in the area.

Recommendations – NCC will consider opportunities to route flood water on the highway away from the affected properties. NCC, the property developers and property owners should review the level of maintenance required to keep the drainage system efficient. NCC will investigate with third parties the potential for retrofitting permeable paving and other small scale drainage systems. The land developers must reinstate the removed drainage features situated to the rear of the affected area.

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies

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.

2 of the incidents (66%) of internal flooding in this catchment are within 2.5km of a rain gauge. The rainfall events recorded by gauges for this catchment are;

19 November 2016 - 14mm rainfall was recorded as falling on the 19th November at the Framlingham Earl rainfall monitoring station. This station only collects daily recordings, therefore the rarity of the rainfall event is not possible to calculate. However, information collected during the flood investigation would suggest that there was intermittent heavy rainfall throughout the day.

12 October 2016 – 4.9mm of rainfall was recorded as falling on the 12th October 2016 at the Framlingham rainfall monitoring station. This station only collects daily recordings, therefore the rarity of the rainfall event is not possible to calculate.

Historic flooding incidents on Caistor Lane, Framlingham Earl

Date of incident	Impact	Rainfall intensity
11/08/2015	Report of internal flooding	0.4mm of rainfall recorded
17/07/2014	Report of external flooding	Unknown
21/01/2015	Report of internal flooding	0.4mm of rainfall recorded
27/01/2015	Report of external flooding	0mm of rainfall recorded

Historic flooding incidents on the Oaklands, Framlingham Earl

The Oaklands has been identified as a focus area in the Poringland Integrated Urban Drainage Pilot Study (2008) due to the number of reports of flooding.

Historic flooding incidents on Norwich Road, Framlingham Earl

There are no historic records of flooding on this road.

Flooding in the Poringland East Area

Description of area

An ordinary watercourse runs through the centre of this area and flows towards the south east of the area into Well Beck. The village is characterised by residential areas and parkland.

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
14/04/2016	On the 14/04/2016 - 1 property was internally flooded on Burgate Lane, Alpington. This incident was reported by a resident via an online flood report form on the 22 April 2016, (FWF/16/7/2573)	A resident carried out measures to minimise the impact of flooding during the incident. Norfolk County Council assessed the validity and impact of the flood report.
31/08/2015	On the 31/08/2015 - 2 properties were internally flooded on Threadneedle Street, Bergh Apton. These incidents were reported by: a resident via an online flood report form on the 31 August 2015, (FWF/15/7/1869) a resident via an online flood report form on the 31 August 2015, (FWF/16/7/3690)	Norfolk County Council carried out measures to minimise the impact of flooding after the incident.

Flooding on Burgate Lane

Location: **Poringland East**

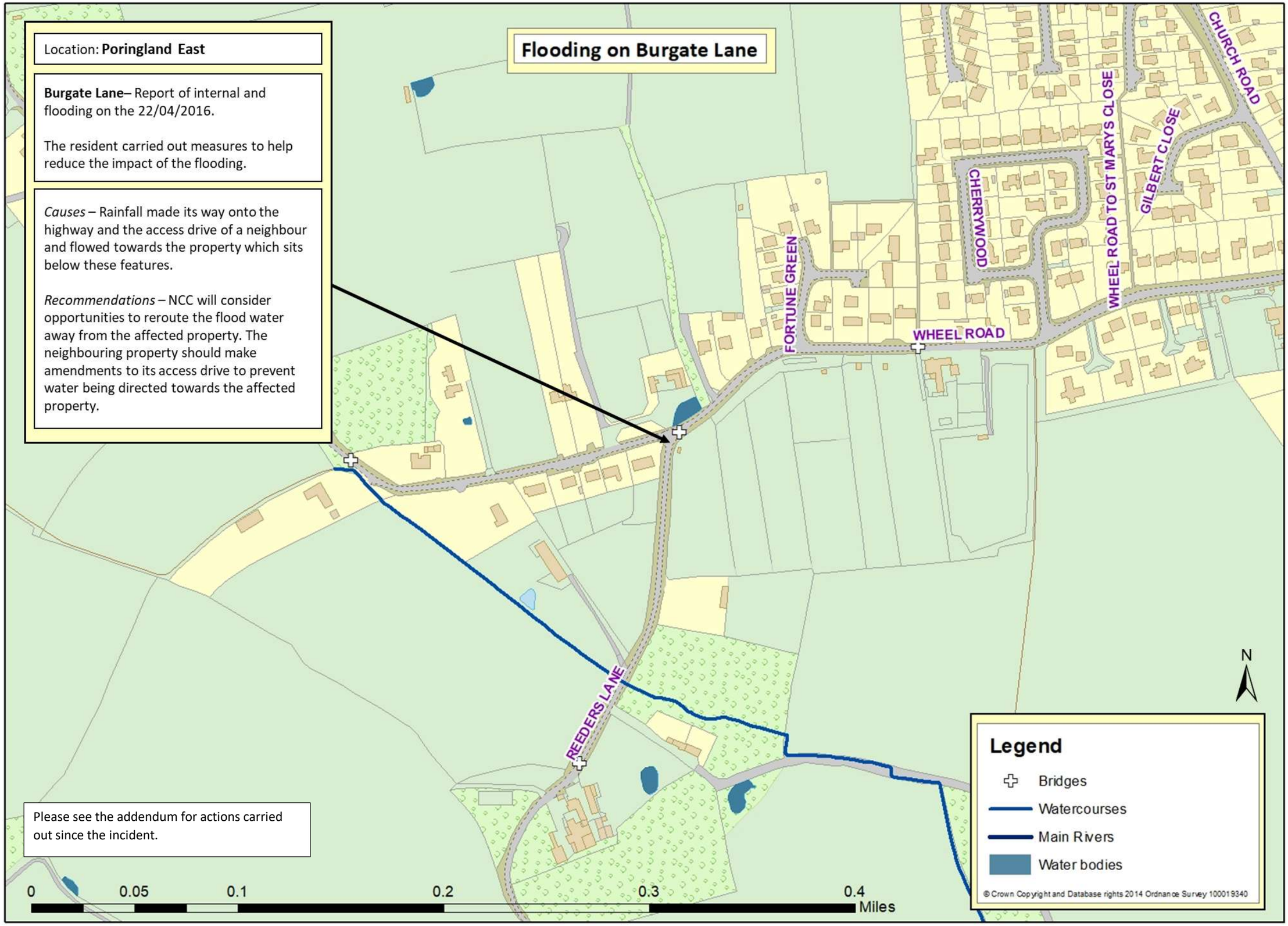
Burgate Lane– Report of internal and flooding on the 22/04/2016.

The resident carried out measures to help reduce the impact of the flooding.

Causes – Rainfall made its way onto the highway and the access drive of a neighbour and flowed towards the property which sits below these features.

Recommendations – NCC will consider opportunities to reroute the flood water away from the affected property. The neighbouring property should make amendments to its access drive to prevent water being directed towards the affected property.

Please see the addendum for actions carried out since the incident.



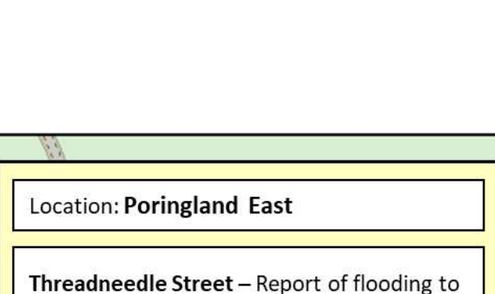
Flooding on Threadneedle Street

Location: **Poringland East**

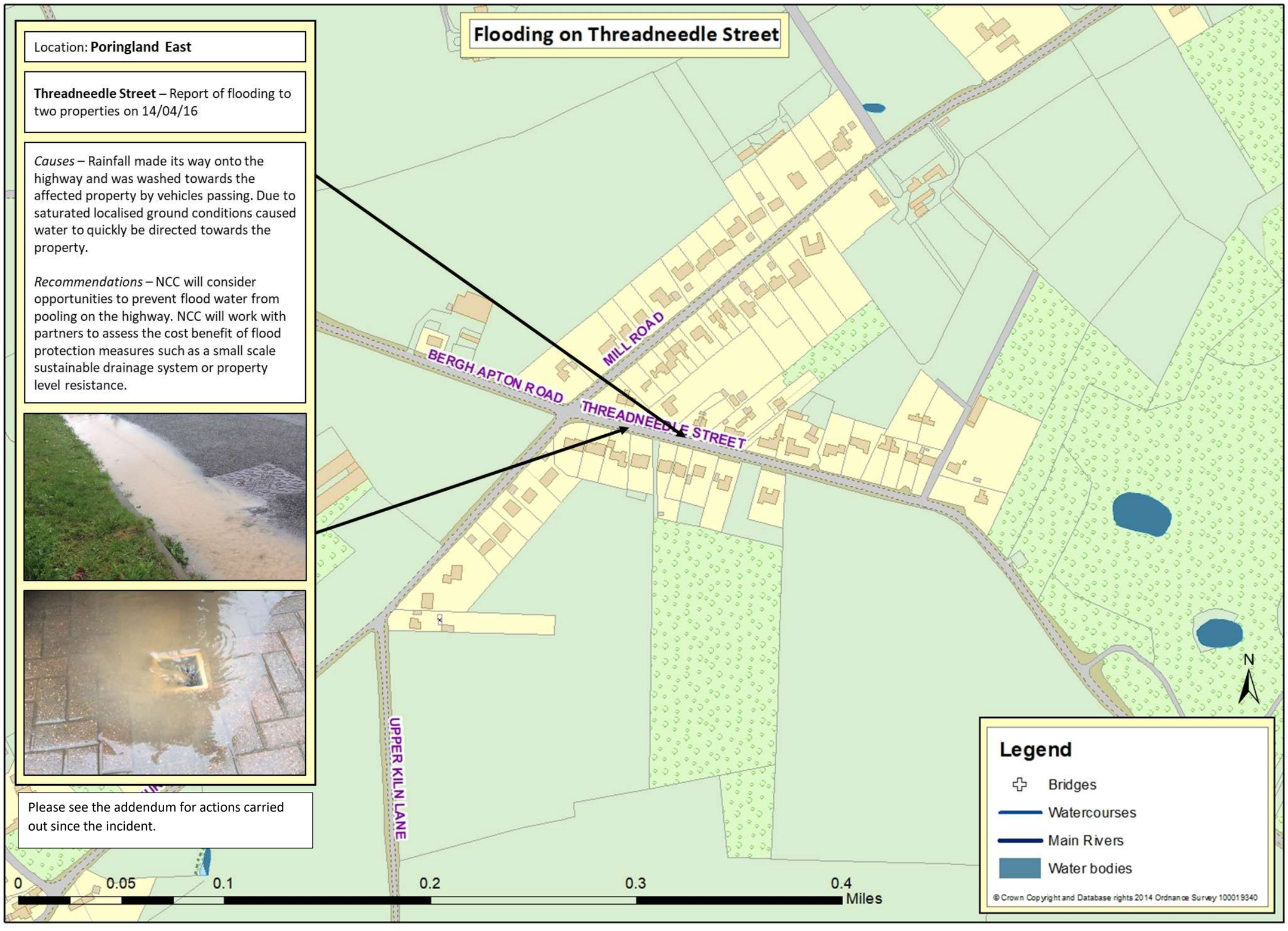
Threadneedle Street – Report of flooding to two properties on 14/04/16

Causes – Rainfall made its way onto the highway and was washed towards the affected property by vehicles passing. Due to saturated localised ground conditions caused water to quickly be directed towards the property.

Recommendations – NCC will consider opportunities to prevent flood water from pooling on the highway. NCC will work with partners to assess the cost benefit of flood protection measures such as a small scale sustainable drainage system or property level resistance.



Please see the addendum for actions carried out since 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.

3 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;

31 August 2015 - 12mm rainfall was recorded as falling throughout the day at the Poringland RC (Telem) rainfall monitoring station. The heaviest rainfall was experienced from 08:30 – 10:15 and 11:30 – 13:30.

14 April 2016 - 28mm rainfall was recorded as falling in 3 hours 0 minutes at the Poringland RG (Telem) rainfall monitoring station. This intensity of rainfall for the total duration equates to a 1:5.7 year rainfall event.

26 August 2015 – 29mm rainfall was recorded as falling at Poringland RG (Telem) rainfall monitoring station. 28mm of this rainfall fell in 1 hour and 45 minutes this intensity of rainfall for the total duration equates to a 1:7 year rainfall event.

Historic flooding incidents on Burgate Lane, Alpington

There are no historic records of flooding on this road.

Historic flooding incidents on Threadneedle Street, Bergh Apton

There are no historic records of flooding on this road.

Flooding in the Surlingham and Rockland St Mary area

Description of the Area

Surlingham and Rockland St Mary both sit at areas of low elevation in the area. The area between Rockland St Mary and Surlingham is characterised by relatively flat agricultural land. Around the northern edge of Surlingham and to the East of Rockland St Mary there is areas of marshland and fens. Surface water in these areas flow to the river Yare and its associated water courses.

Flood incidents within this catchment

Within this catchment 1 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
12/07/2016	On the 12/07/2016 - 1 property was internally flooded on Oak Close, Surlingham. This incident was reported by Norfolk County via email correspondence on the 5 December 2016, (FWF/16/7/3100)	A resident carried out measures to minimise the impact of flooding during the incident. A local community group carried out measures to minimise the impact of flooding after the incident.

Flooding on Oak Close

Location: **Surlingham and Rockland St Mary**

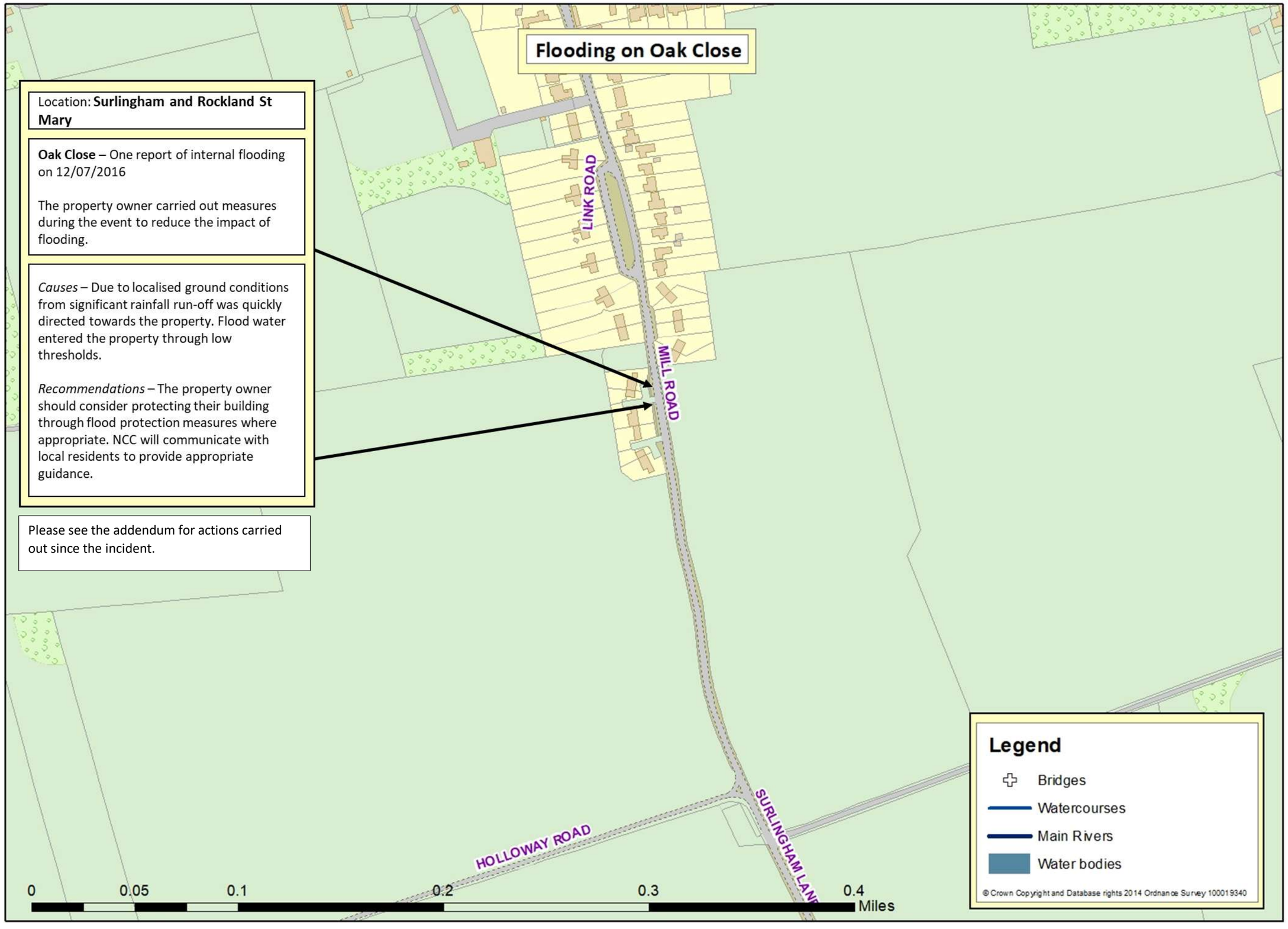
Oak Close – One report of internal flooding on 12/07/2016

The property owner carried out measures during the event to reduce the impact of flooding.

Causes – Due to localised ground conditions from significant rainfall run-off was quickly directed towards the property. Flood water entered the property through low thresholds.

Recommendations – The property owner should consider protecting their building through flood protection measures where appropriate. NCC will communicate with local residents to provide appropriate guidance.

Please see the addendum for actions carried out since 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.

12 July 2016 – Although this property does not sit within 2.5km of a rain gauge data from the Met Office shows that there were heavy showers in the East of England on this date. With 47mm of rainfall being recorded as having fallen in Lingwood (Norfolk)[2]. Multiple reports of flooding were received for South Norfolk on this date, further suggesting that heavy localised rainfall was experienced on this date.

Historic flooding incidents on Oak Close, Surlingham

There are no historic records of flooding on this road.

[2] Met Office (2016) UK Climate Summaries – July 2016
https://www.metoffice.gov.uk/climate/uk/summaries/2016/july

Flooding in the Mundham area

Description of catchment

Mundham is located in a fairly flat area with a slight decline in the landscape towards the north east of the area. The area compromises of mainly agricultural land.

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
13/03/2013	On the 13/03/2013 - 1 property was internally flooded on Birch Way, Mundham. This incident was reported by a Norfolk County Councillor via email correspondence on the 13 March 2013, (FWF/13/7/0191)	Norfolk County visited the area to gather information after the incident. NCC contacted the riparian owner to inform them of their riparian duties.

Flooding on Birch Way

Location: **Mundham**

Birch Way– Report of internal and flooding on the 13/03/2013.

NCC undertook a site visit to assess the site and gather information. NCC contacted the riparian owner to inform of their duties to maintain ditches.

Causes – A ditch was blocked making it unable to cope with the rainfall. This increased run-off along the flow path on which the property sits. The property had structural issues which did not cope with the level of rainfall.

Recommendations – NCC will explore with partners potential flood mitigation measures such as a small scale sustainable drainage system or Property Level Resistance. Landowners should ensure that ditches are maintained to reduce the risk of flooding.

BIRCH WAY

SANDY LANE

THWAITE ROAD

N

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies

0 0.05 0.1 0.2 0.3 0.4 Miles

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 on Birch Way, Mundham

No other recorded incidents but flooding reported to be an issue for a number of years by resident.

Flooding in the Ditchingham Dam area

Description of catchment

Ditchingham Dam is a low flat area that the River Waveney passes through. There is a large number of ordinary watercourses in the area that are associated with this river. Ditchingham Dam is close to a watercourse maintained by the Waveney Lower Yare & Lothingland Internal Drainage Board. The Waveney Lower Yare & Lothingland Internal Drainage Board keep clearance to a minimum of avoid damage to wildlife and fish habitats. The watercourse is cleared approximately every 5 years depending on local conditions and reports of problems.

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
21/07/2014	On the 21/07/2014 - 1 property was internally flooded on Ditchingham Dam, Ditchingham. This incident was reported by South Norfolk District Council via email correspondence on the 8 March 2016, (FWF/14/7/2572)	South Norfolk District offered advice to the residents over the phone and sandbags were made available.

Location: **Ditchingham Dam**

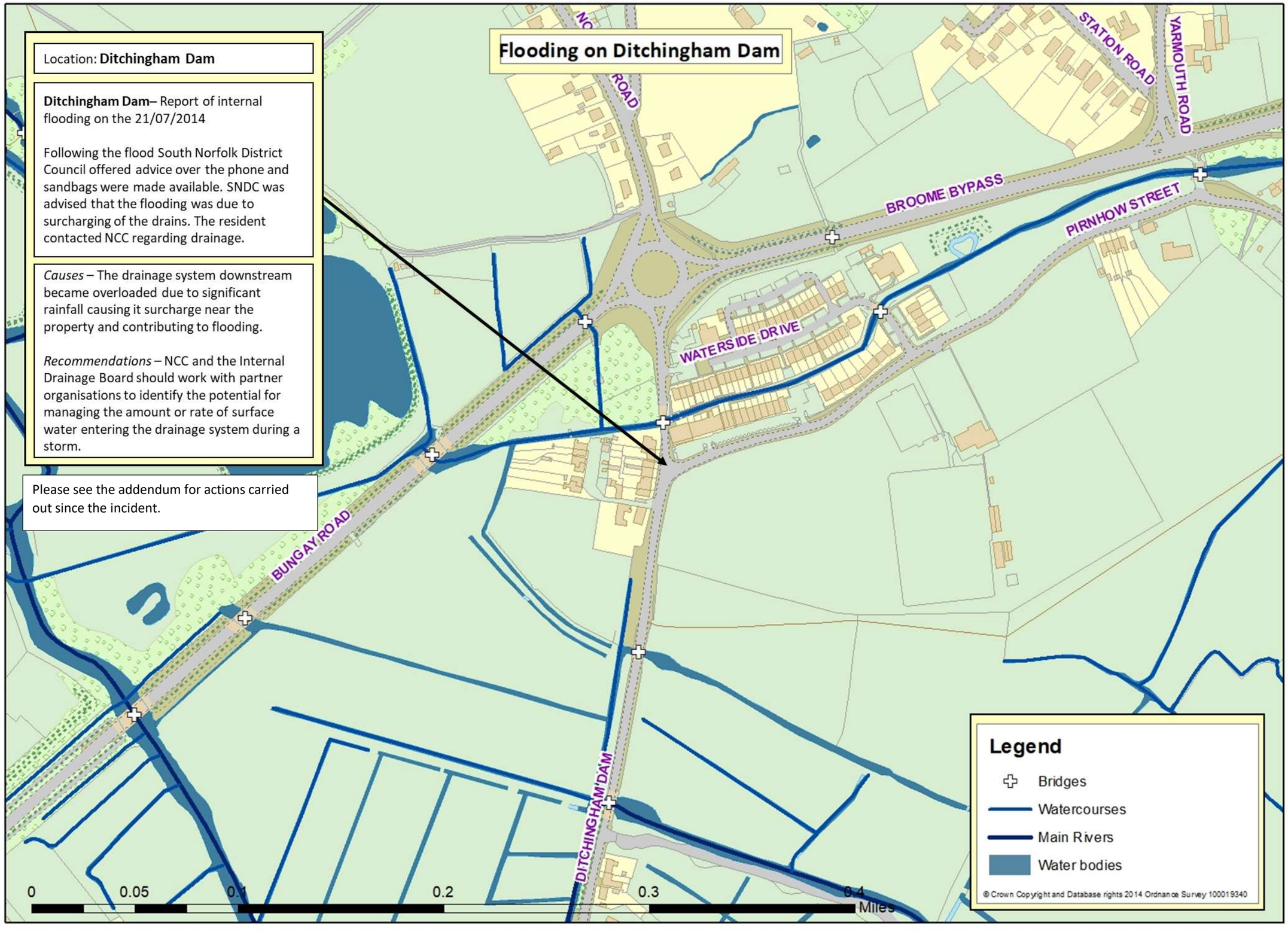
Ditchingham Dam– Report of internal flooding on the 21/07/2014

Following the flood South Norfolk District Council offered advice over the phone and sandbags were made available. SNDC was advised that the flooding was due to surcharging of the drains. The resident contacted NCC regarding drainage.

Causes – The drainage system downstream became overloaded due to significant rainfall causing it surcharge near the property and contributing to flooding.

Recommendations – NCC and the Internal Drainage Board should work with partner organisations to identify the potential for managing the amount or rate of surface water entering the drainage system during a storm.

Please see the addendum for actions carried out since 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.

21/07/2014 – Although this incident is not located within 2.5km of a rainfall gauge we know from Met Office data that heavy rainfall was experienced between Friday 18th and Sunday the 20th. This could have led to the ground being saturates locally and increasing the chance of flooding. During this time Norwich Airport recorded 45.8mm of rainfall, three quarters of the normal monthly amount, within one hour[3].

Historic flooding incidents on Ditchingham Dam, Ditchingham

There are no recorded reports of historic flooding on this road.

[3] Met Office (2014) UK Climate Summaries – July 2014. https://www.metoffice.gov.uk/climate/uk/summaries/2014/july

Flooding in the Harleston Area

Description of catchment

Flow paths within Harleston flow from the East and West to converge in the centre of the town where they then flow south. Harleston is characterised by residential areas.

Flood incidents within this catchment

Within this catchment 4 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
23/07/2014	On the 23/07/2014 - 2 properties were internally flooded on Broad Street, Redenhall with Harleston. These incidents were reported by: a resident via an online flood report form on the 24 July 2014, (FWF/14/7/1167) a resident via email correspondence on the 11 July 2014, (FWF/14/7/1168)	Norfolk County visited affected residents to offer advice and to gather information after the incident. Norfolk County Council carried out measures to minimise the impact of flooding after the incident.
27/06/2014	On the 27/06/2014 - 1 property was internally flooded on Broad Street, Redenhall with Harleston. This incident was reported by a resident via a flood questionnaire on the 24 July 2014, (FWF/14/7/0899)	South Norfolk District Council visited affected residents to offer advice and to gather information after the incident. Norfolk County carried out measures to minimise the impact of flooding after the incident.
11/06/2016	On the 11/06/2016 - 1 property was internally flooded on The Thoroughfare, Harleston. This incident was reported by Norfolk County Council (Highways) via an electronic report on the 1 August 2016, (FWF/16/7/3988)	Norfolk County Council visited the affected residents to gather information after the incident.

Flooding on The Thoroughfare and Broad Street

Please see the addendum for actions carried out since the incident.

Location: **Harleston**

The Thoroughfare – Report of internal and flooding on the 11/06/2016

Causes – The property is situated along a flow path. Flow along this path was increased due to a partially obstructed drainage system. Run-off from rainfall was directed towards drainage network. These flows could not be accommodated as the system was already overloaded. This directed flood water towards the affected property.

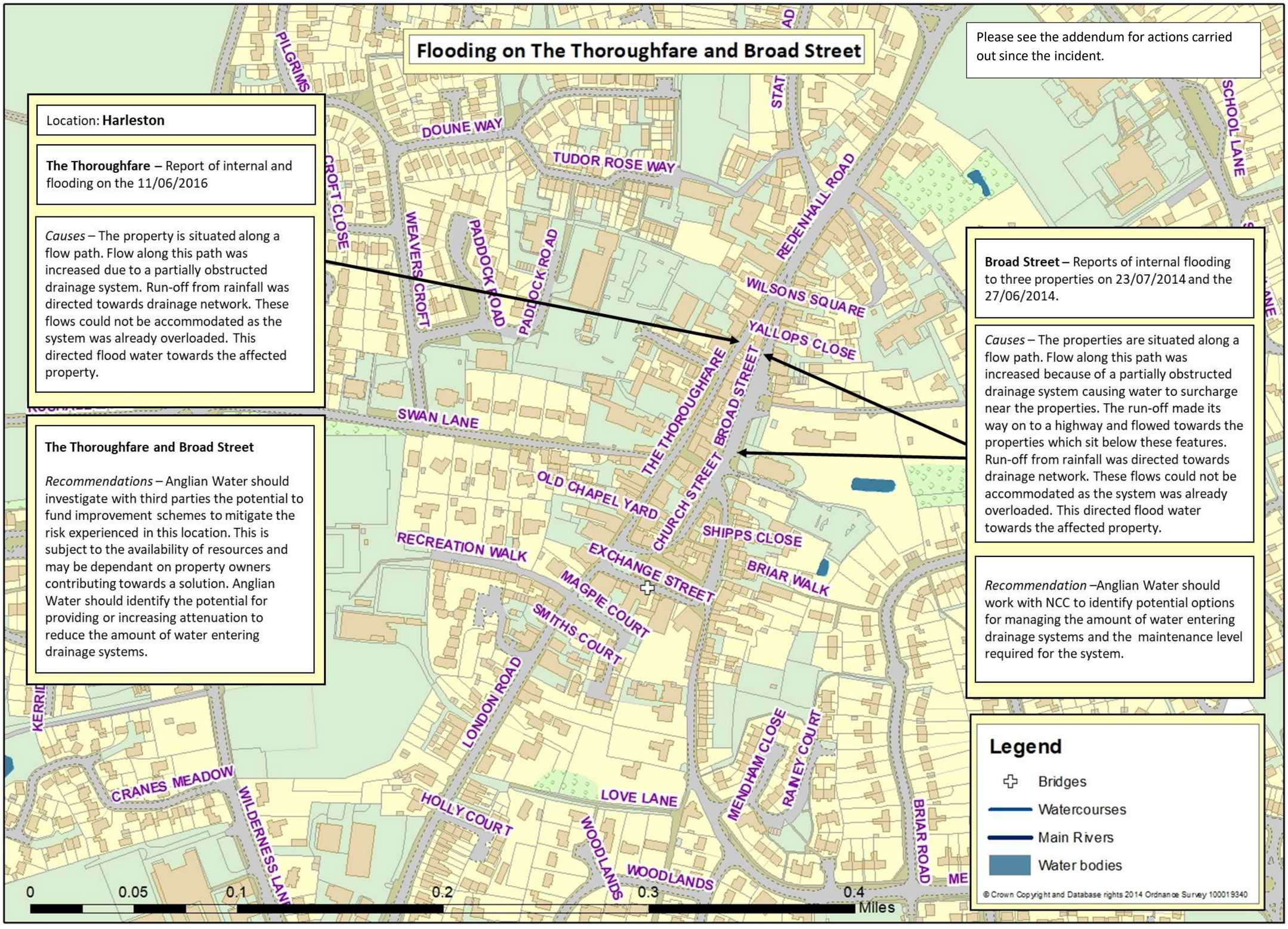
The Thoroughfare and Broad Street

Recommendations – Anglian Water should investigate with third parties the potential to fund improvement schemes to mitigate the risk experienced in this location. This is subject to the availability of resources and may be dependant on property owners contributing towards a solution. Anglian Water should identify the potential for providing or increasing attenuation to reduce the amount of water entering drainage systems.

Broad Street – Reports of internal flooding to three properties on 23/07/2014 and the 27/06/2014.

Causes – The properties are situated along a flow path. Flow along this path was increased because of a partially obstructed drainage system causing water to surcharge near the properties. The run-off made its way on to a highway and flowed towards the properties which sit below these features. Run-off from rainfall was directed towards drainage network. These flows could not be accommodated as the system was already overloaded. This directed flood water towards the affected property.

Recommendation –Anglian Water should work with NCC to identify potential options for managing the amount of water entering drainage systems and the maintenance level required for the system.



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.

3 of the incidents (75%) of internal flooding in this catchment are within 2.5km of a rain gauge. The rainfall events recorded by gauges for this catchment are;

27 June 2014 - 4mm rainfall was recorded as falling throughout the day at the Harleston STW rainfall monitoring station.

11 June 2016 - 30mm rainfall was recorded as falling in 1 hours 45 minutes at the Harleston STW rainfall monitoring station. This intensity of rainfall for the total duration equates to a 6.57 year rainfall event.

Historic flooding incidents on Broad Street, Harleston

Date of incident	Impact	Rainfall intensity
27/06/2009	Three reports of internal flooding	Unknown
28/06/2014	Report of internal flooding	1 in 2.7 year rainfall event
22/07/2014	Report of internal flooding	Unknown
14/06/2014	Report of internal flooding	Unknown

Historic flooding incidents on The Thoroughfare, Harleston

Date of incident	Impact	Rainfall intensity
27/06/2009	Reports of internal flooding	Unknown

Flooding in the Winfarthing and Burston Area

Description of the area

In the Winfarthing area an ordinary watercourse runs through the centre of the settlement. Many flows converge along the central watercourse both upstream of and within the settlement. Winfarthing is close to a watercourse maintained by the Waveney Lower Yare & Lothingland Internal Drainage Board. The Waveney Lower Yare & Lothingland Internal Drainage Board keep clearance to a minimum of avoid damage to wildlife and fish habitats. The watercourse is cleared approximately every 5 years depending on local conditions and reports of problems.

The landscape of Burston is flat and dominated by agricultural land. Surface water flows mainly in a westerly direction towards an ordinary watercourse.

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
25/06/2016	On the 25/06/2016 - 1 property was internally flooded on Bridge Road, Burston and Shimpling. This incident was reported by the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/7/3361)	The Fire and Rescue Service carried out measures to minimise the impact of flooding during the incident. A resident carried out measures to minimise the impact of flooding during the incident.
25/06/2016	On the 25/06/2016 - 1 property was internally flooded on Diss Road, Burston and Shimpling. This incident was reported by the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/7/3378)	The Fire and Rescue Service carried out measures to minimise the impact of flooding during the incident. Police 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.
25/06/2016	On the 25/06/2016 - 1 property was internally flooded on The Street, Winfarthing. This incident was reported by a resident via a flood questionnaire on the 17 October 2016, (FWF/16/7/3382)	Norfolk County Council visited affected residents to offer advice and to gather information after the incident.

Flooding on Diss Road

Location: **Winfarthing and Burston**

Diss Road– One report of internal flooding on 25/06/2016

During the event the Fire and Rescue Service set up booms to direct the water away from the property and the police closed the road. NCC visited the site to gather information and provide advice following the event.

Causes – Run-off from rainfall was concentrated along an overland flow path which the property sits adjacent to. Rainfall was directed towards the surface water drainage system which could not be accommodated as the flow was already overloaded. Water entered the property through low thresholds.

Recommendations – NCC should work with partner organisations to identify the potential for managing the amount of water entering the drainage system. The property owner should consider flood protection measures where appropriate.

Please see the addendum for actions carried out since the incident.

MILL ROAD
CROWN GREEN
AUDLEY END
HIGDON CLOSE
DISS ROAD
MARKET LANE
BRIDGES HILL

0 0.05 0.1 0.2 0.3 0.4 Miles

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies

Flooding on Bridge Road

Location: **Winfarthing and Burston**

Bridge Road– One report of internal flooding on 25/06/2016

Fire Brigade attended during the incident to provide advice. A resident took measures to try and keep drains clear during the incident which were becoming blocked from straw from a field upstream.

Causes – The property sits on an overland flow path on which rainfall was concentrated. The surface run-off made its way onto the highway from the neighbouring field, bringing with it straw and debris. This flowed towards the affected property and obstructed the surface drainage system causing flooding at the affected property.

Recommendations – NCC will consider opportunities to route flood water on the highway away from the property. NCC should work with the riparian owner to determine an appropriate maintenance regime which would reduce the flood risk to the affected property.

BRIDGE ROAD

MILL GREEN

0 0.05 0.1 0.2 0.3 0.4 Miles

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies

Flooding on The Street

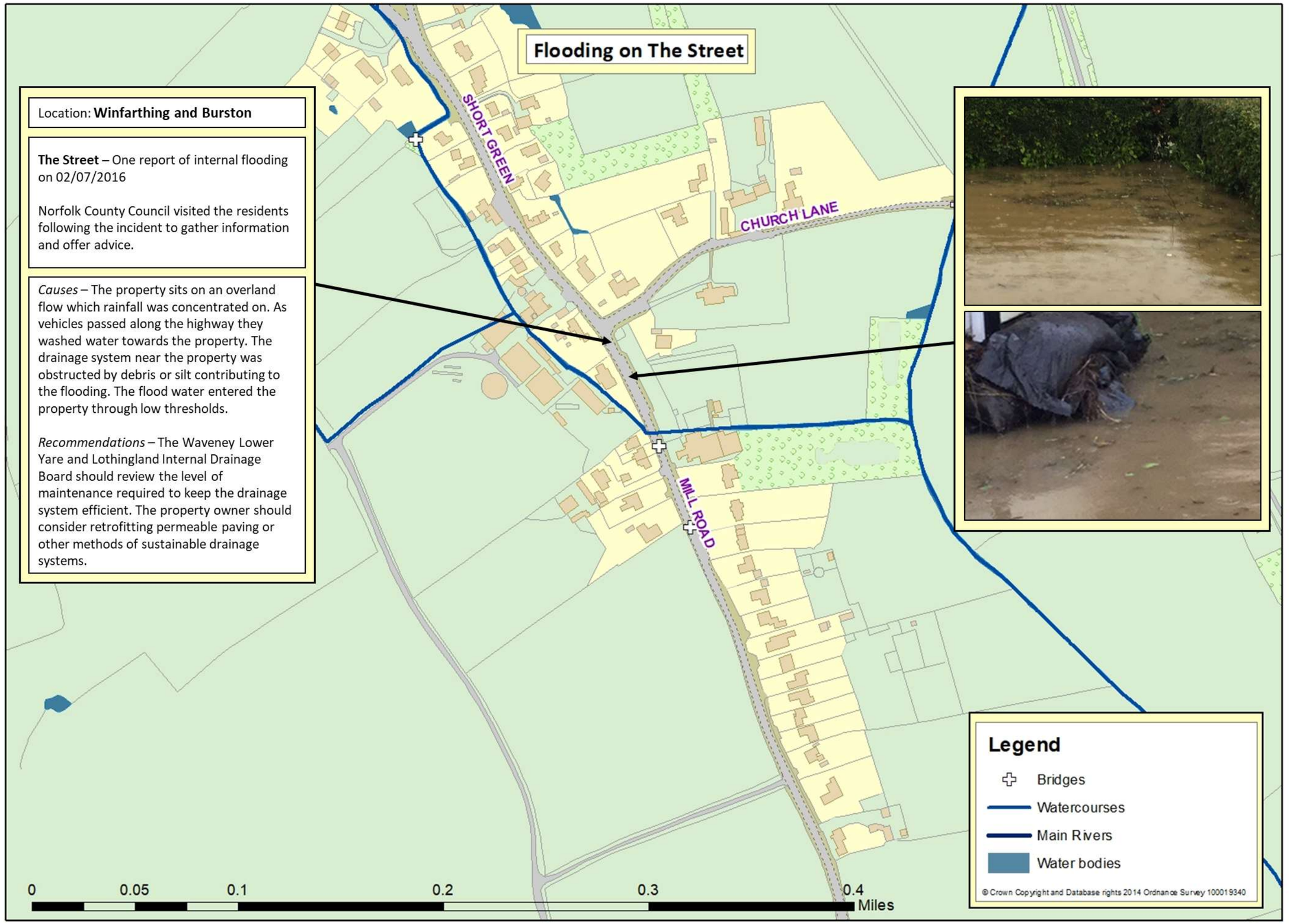
Location: **Winfarthing and Burston**

The Street – One report of internal flooding on 02/07/2016

Norfolk County Council visited the residents following the incident to gather information and offer advice.

Causes – The property sits on an overland flow which rainfall was concentrated on. As vehicles passed along the highway they washed water towards the property. The drainage system near the property was obstructed by debris or silt contributing to the flooding. The flood water entered the property through low thresholds.

Recommendations – The Waveney Lower Yare and Lothingland Internal Drainage Board should review the level of maintenance required to keep the drainage system efficient. The property owner should consider retrofitting permeable paving or other methods of sustainable drainage systems.



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.

Although there are no rain gauges within 2.5km of these incidents, information collected from flood reports suggests there was sudden, heavy rainfall. This is supported by the number of flood reports that were received in the area.

Historic flooding incidents on Bridge Road, Burston

There are no other historic records of flooding on this road.

Historic flooding incidents on Diss Road, Burston

There are no other historic records of flooding on this road.

Historic flooding incidents on The Street, Winfarthing

There are no other historic records of flooding on this road.

However, Winfarthing experienced extensive flooding on the 16 June 2001.

Flooding in Hethersett catchment

Description of catchment

The south west of Hethersett is the highest elevation point within the area. Rain water that falls in the northern half of the town flows in a north easterly direction and converges in the north west area of the town before joining an ordinary watercourse to the east of the town. Rainwater that fall in the southern half of Hethesett flows in an easterly direction and converges in an ordinary watercourse just outside of the town. Hethersett is mainly residential and surrounded by agricultural land.

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
08/03/2016	On the 08/03/2016 - 1 property was internally flooded on Jaguar Road, Hethersett. This incident was reported by South Norfolk District Council via email correspondence on the 8 March 2016, (FWF/16/7/2443)	South Norfolk District Council visited affected residents to offer advice and to gather information after the incident. Following the visit they took measures to minimise the impact of flooding.

Flooding on Jaguar Road

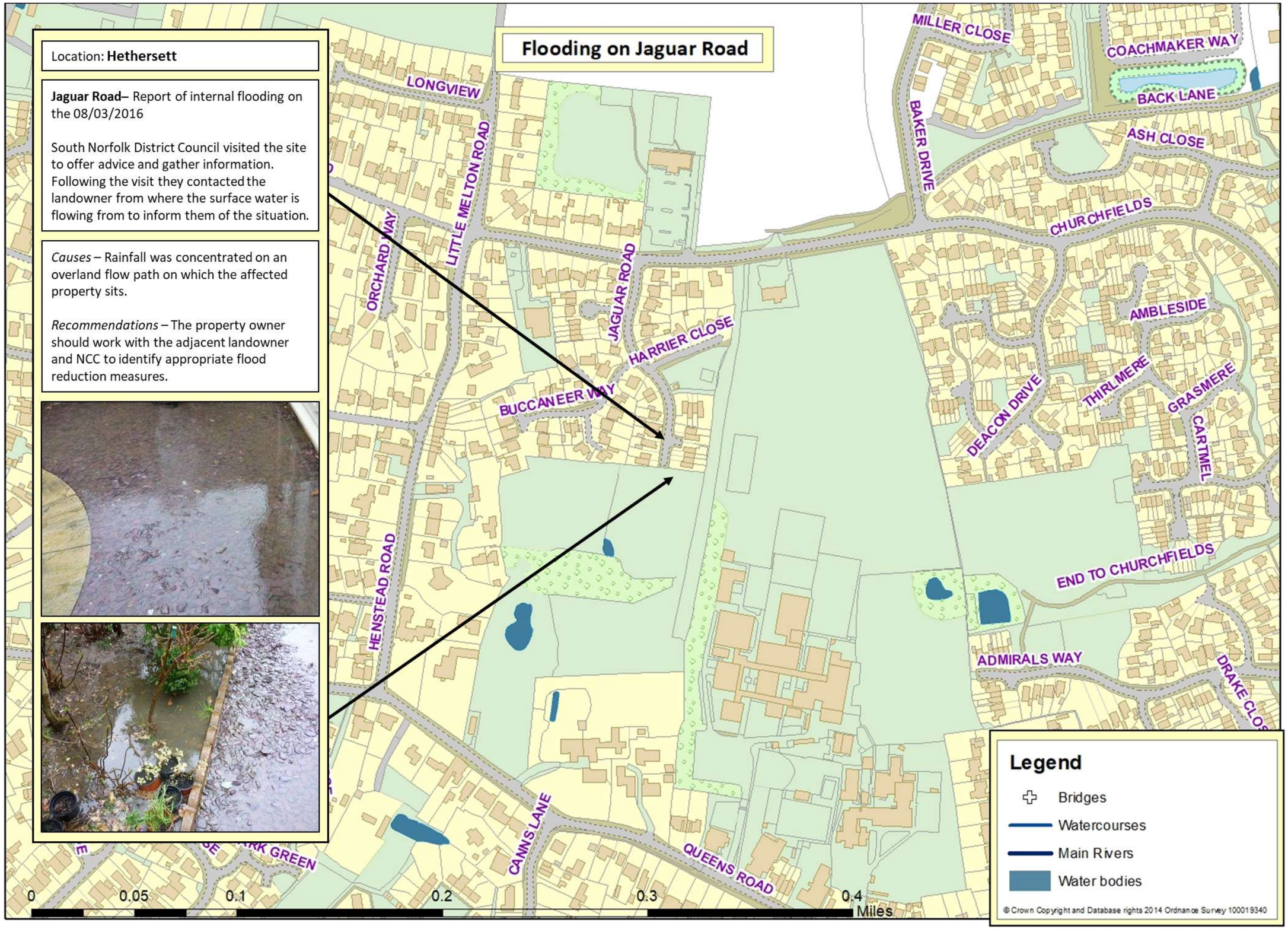
Location: **Hethersett**

Jaguar Road– Report of internal flooding on the 08/03/2016

South Norfolk District Council visited the site to offer advice and gather information. Following the visit they contacted the landowner from where the surface water is flowing from to inform them of the situation.

Causes – Rainfall was concentrated on an overland flow path on which the affected property sits.

Recommendations – The property owner should work with the adjacent landowner and NCC to identify appropriate flood reduction measures.



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;

08/03/2016 – This rainfall gauge recorded 0.2mm of rainfall on the 08th March 2016. This does not reflect the flooding experienced at the property, suggesting there was heavy localised rainfall.

Historic flooding incidents on Jaguar Road, Hethersett

Date of incident	Impact	Rainfall intensity
14/02/2013	Report of external flooding	Unknown
07/08/2013	Report of external flooding	Unknown
08/03/2016	Report of internal flooding	Unknown

Flooding in the Scole area

Description of catchment

Water around the Norwich Road area of Scole flows from the North of Scole to the south along Norwich road where many flow paths converge. These flow paths join ordinary watercourses before out letting to the River Waveney.

Diss Road is located in the West of Scole. In this area surface run-off flows in a south-easterly direction where it converges then flows South towards the River Waveney.

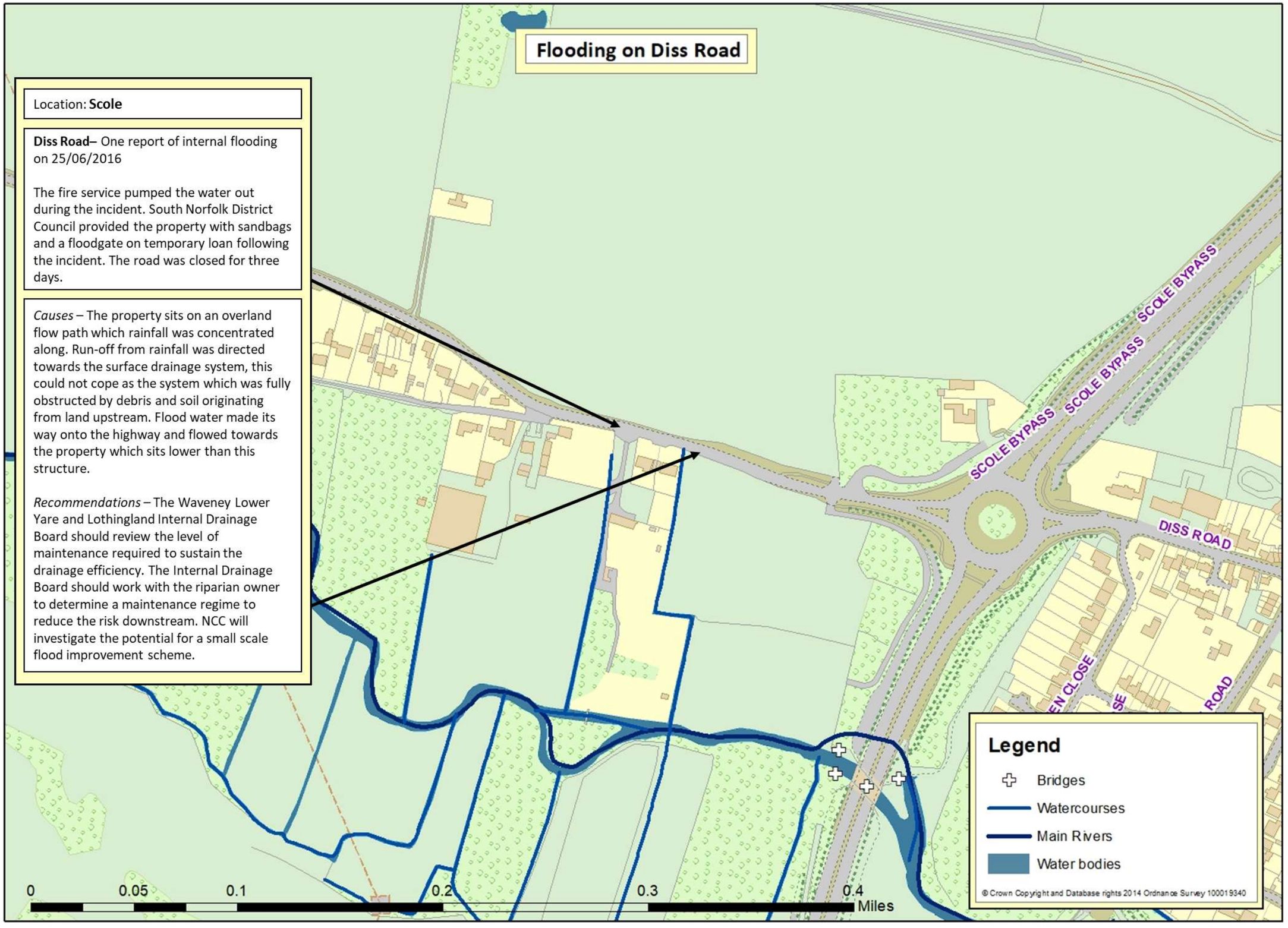
Scole Common Road is located to the east of Frenze. The highest point of the catchment is to the east, run-off flows in an easterly direction converging to the north of Scole Common and Frenze before joining the River Waveney.

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
25/06/2016	On the 25/06/2016 - 3 properties were internally flooded on Norwich Road, Scole. These incidents were reported by: a resident via an online flood report form on the 27 June 2016, (FWF/16/7/2850) a resident via an online flood report form on the 27 June 2016, (FWF/16/7/2852) a resident via an online flood report form on the 27 July 2016, (FWF/16/7/2853)	Norfolk County Council assessed the validity and impact of the flood report.
25/06/2016	On the 25/06/2016 - 1 property was internally flooded on Norwich Road, Scole. This incident was reported by a resident via an online flood report form on the 27 June 2016, (FWF/16/7/2851)	Norfolk County Council carried out measures to minimise the impact of flooding after the incident.
25/06/2016	On the 25/06/2016 - 1 property was internally flooded on Diss Road, Scole. This incident was reported by South Norfolk District Council via email correspondence on the 11 August 2016, (FWF/16/7/3194)	A resident carried out measures to minimise the impact of flooding during the incident. South Norfolk District Council carried out measures to minimise the impact of flooding after the incident. The Fire and Rescue Service responded and pumped out during the incident. Norfolk County carried out measures to minimise the impact of flooding after the incident.

25/06/2016	On the 25/06/2016 - 1 property was internally flooded on Scole Common Road, Scole. This incident was reported by the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/7/3376)	The Fire and Rescue Service responded and pumped out during the incident. A resident carried out measures to minimise the impact of flooding after the incident.


Flooding on Diss Road
Location: Scole
Diss Road– One report of internal flooding on 25/06/2016
The fire service pumped the water out during the incident. South Norfolk District Council provided the property with sandbags and a floodgate on temporary loan following the incident. The road was closed for three days.
Causes – The property sits on an overland flow path which rainfall was concentrated along. Run-off from rainfall was directed towards the surface drainage system, this could not cope as the system which was fully obstructed by debris and soil originating from land upstream. Flood water made its way onto the highway and flowed towards the property which sits lower than this structure.
Recommendations – The Waveney Lower Yare and Lothingland Internal Drainage Board should review the level of maintenance required to sustain the drainage efficiency. The Internal Drainage Board should work with the riparian owner to determine a maintenance regime to reduce the risk downstream. NCC will investigate the potential for a small scale flood improvement scheme.
SCOLE BYPASS
DISS ROAD
Legend
Bridges
Watercourses
Main Rivers
Water bodies
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340
0
0.05
0.1
0.2
0.3
0.4
Miles

Flooding on Scole Common Road

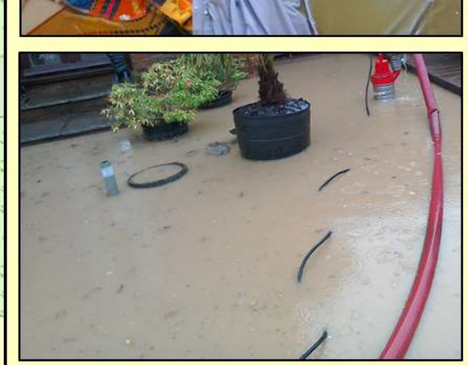
Location: Scole

Scole Common Road– One report of internal flooding on 25/06/2016

The Fire and Rescue service attended during the incident and attempted to pump out water. Prior to the event the property owner ensured ditches surrounding the property were well maintained.

Causes – Run off from rainfall was concentrated an overland flow path on which the property sits. Water was directed from neighbouring land towards the affected property. The run-off was directed towards the individual property drainage which was unable to cope with the capacity of water causing flooding at the affected property.

Recommendations – NCC will work with the land owner to ensure that water is not directed towards the effected property, for example through land management techniques. The property owner should ensure that ditches around the property continue to be well maintained for sufficient drainage.



FRENZE LANE

SCOLE COMMON

DARK LANE

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies

0 0.05 0.1 0.2 0.3 0.4 Miles

Flooding on Norwich Road

Location: **Scole**

Norwich Road– Four reports of internal flooding on the 25/06/2016

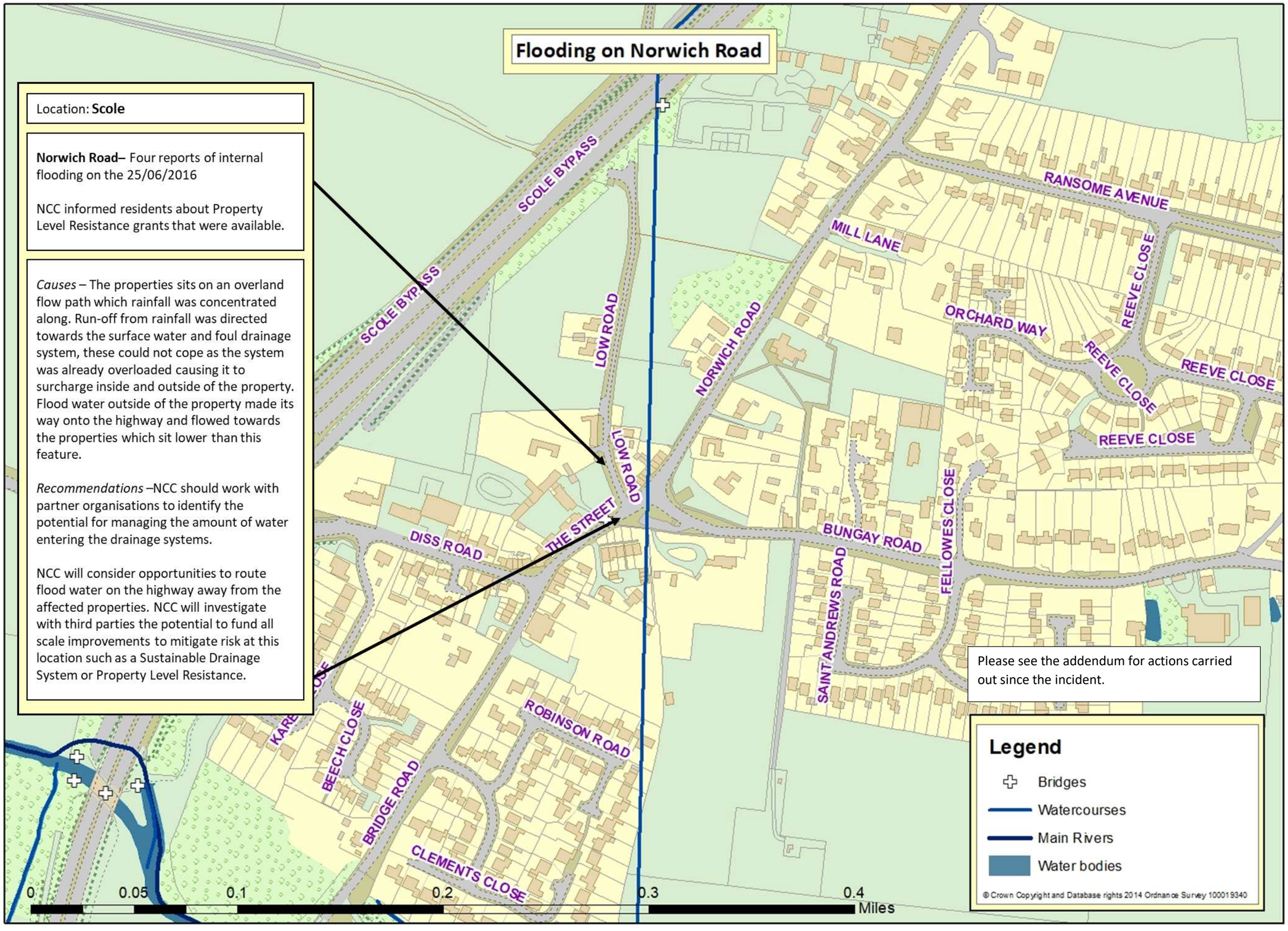
NCC informed residents about Property Level Resistance grants that were available.

Causes – The properties sits on an overland flow path which rainfall was concentrated along. Run-off from rainfall was directed towards the surface water and foul drainage system, these could not cope as the system was already overloaded causing it to surcharge inside and outside of the property. Flood water outside of the property made its way onto the highway and flowed towards the properties which sit lower than this feature.

Recommendations –NCC should work with partner organisations to identify the potential for managing the amount of water entering the drainage systems.

NCC will consider opportunities to route flood water on the highway away from the affected properties. NCC will investigate with third parties the potential to fund all scale improvements to mitigate risk at this location such as a Sustainable Drainage System or Property Level Resistance.

Please see the addendum for actions carried out since 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 on Norwich Road, Scole

Date of incident	Impact	Rainfall intensity
19/02/2015	Report of internal flooding	Unknown

Historic flooding incidents on Diss Road, Scole

Date of incident	Impact	Rainfall intensity
26/05/2014	Report of internal flooding	Unknown

Historic flooding incidents on Scole Common Road, Scole

There are no records of historic flooding on this road.

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.

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.