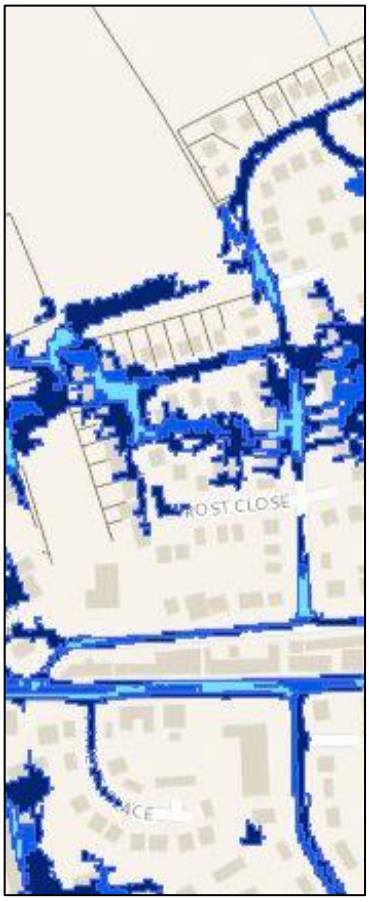
Flood Investigation Report

Flooding in Watton and surrounding area on 23 June 2016



Report Reference: FIR015

Draft Report Final, prepared by Mark Ogden on 12 December 2017

Norfolk County Council

Contents

Executive Summary

(a) Flooding incidents

Flooding in Watton, Saham Toney and Ovington occurred on 23 June 2016. The rainfall event on this date generated 164 reports of flooding that led to the identification of 73 properties that had suffered internal flooding. The properties affected were concentrated in 8 separate catchments[1] with other isolated reports received outside of these. A summary of the 73 properties affected in each catchment are set out below;

- Saham Toney Watercourse – 12 properties
- Ovington Cross Watercourse – 9 properties
- South Moor Watercourse – 1 property
- Watton Green Watercourse – 9 properties
- Hembeck Catchment – 13 properties
- Watton Centre Catchment – 23 properties
- Merton Common Watercourse – 3 properties
- King Row Watercourse – 1 property and 1 risk to life
- Wider area of Watton Brook catchment – 2 properties

The incidents of internal flooding in Watton and its environs occurred in the following parishes and at the approximate locations listed below;

- Ashill Parish - Church Road
- Griston Parish - Lancaster Avenue
- Little Cressingham Parish - Threxton Road Industrial Estate
- Merton Parish - Watton Road
- Ovington Parish - Saham Road, Dereham Road,
- Saham Toney Parish - Cley Lane, Pages Lane, Hills Road, Ovington Road, Chequers Lane, Bell Lane, Brandon Road
- Shipdam Parish - King Row
- Watton Parish - Jubilee Road, Brandon Road, Lovell Gardens, Horseshoe Close, Sharman Avenue, Saham Road, Swaffham Road, Meadow Grove, Stokes Avenue, Nelson Court, Langmere Road, Watton Green, High Street and Glebe Road.

19 residents whose properties flooded in June 2016 stated that they had previously experienced flooding. 8 residents referred to a flood event on 15 June 2009 which caused some internal flooding. 1 resident referred to an event in 1992 that also caused internal flooding. 5 residents reported other flood events as having caused external flooding on the following dates May 2016, 31 August 2015, 25 June 2007, 2008 and 1976. 5 residents reported flooding having occurred previously but did not state when or what the impact was.

[1] What are catchments? - To aid the investigation process and, for ease of presentation, the incidents of flooding within this report have been grouped within this document based on hydrological catchments. The purpose of viewing flooding incidents based on catchments reflects the reality that flooding does not respect the administrative boundaries of Risk Management Authorities. Hydrological catchments catch water and discharge it at locations known as outlets. Individual hydrological catchment boundaries are usually formed by ridges of surrounding higher ground, which separate the lower lying areas at a line known as a watershed.

(b) Flooding causes

As the flooding that occurred in Watton in 2016 was concentrated in 8 separate catchments it is evident that certain causes of flooding were only apparent in certain locations. This is particularly true when considering the different run-off characteristics between highly urbanised catchments such as Watton Centre and those of predominantly rural catchments such as Merton Common. More detail on the causes that occurred at the individual catchment level can be found in each section of this report however some of the key trends identified in the flooding of 2016 have been summarised on below;

- The rainfall experienced on 23 June 2016 was recorded East of Watton as being a 1 in 46 year event[2]. However, it is likely that localised areas of the catchment saw a much greater rainfall event as a number of the properties that were internally flooded only correlated with the 1 in 100 year or 1 in 1000 year flood extent mapping. This judgement is supported by the extensive evidence of flooding submitted to the LLFA.
- A large number of the properties impacted are situated on an overland flow paths and/or are below the level of the nearest highway.
- Flooding from watercourses occurred in three catchments that are associated with Saham Toney Watercourse, Hembeck and Ovington Cross Watercourse. A number of features on the watercourses such as culverts had the effect of restricting flood flows experienced during the event.
- 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 such as low thresholds at entrances, unprotected air bricks and services conduits.

[2] Recent rainfall - This report seeks to draw on rainfall data to ascertain the intensity of the rainfall events experienced across the catchments 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 across each catchment. Where there is no available data within this radius this will be stated.

(c) Key recommendations

The recommendations set out in the report have been summarised below. Specific recommendations for each individual catchment are set out within the report. Please note a large number of these recommendations have already been followed up by the respective organisations identified. Progress against these recommendations will assessed as part of an addendum to this report to be undertaken a year from the date of publication of this report.

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.

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.

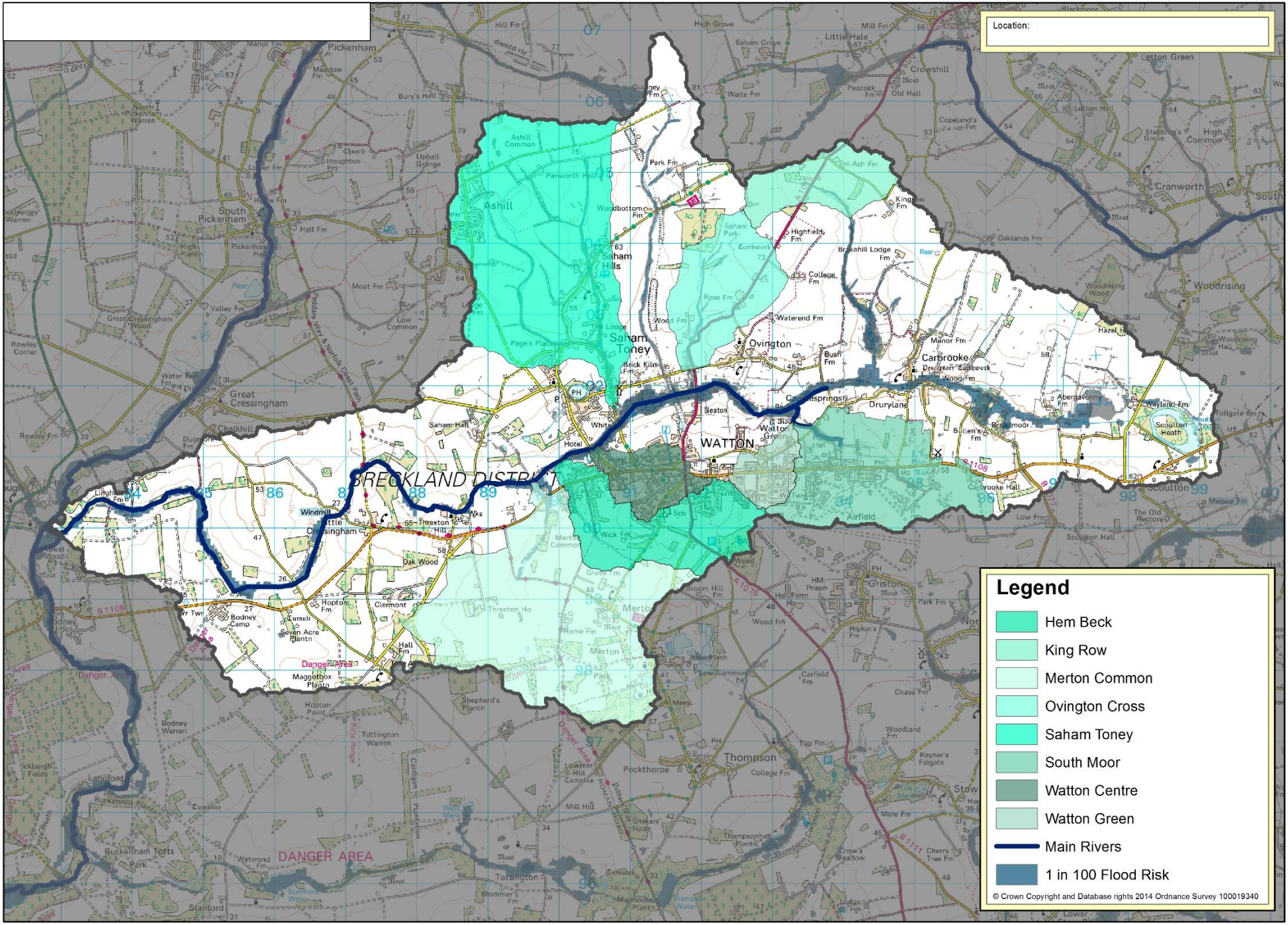
Anglian Water should;

- 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.

Map of catchments used within this report

Watton Brook catchments



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 and/or flooding to priority 1 and 2 gritting routes made impassable due to flooding.
- Flooding adversely impacting a rail link by making it impassable.

It was deemed necessary to complete a formal Investigation Report into the flooding in Watton in 23-25 June 2016 as:

- multiple residential properties were internally flooded.
- multiple commercial properties were internally flooded.
- a number of roads were made impassable
- a number of motorists became stranded with flood water causing risk to life

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

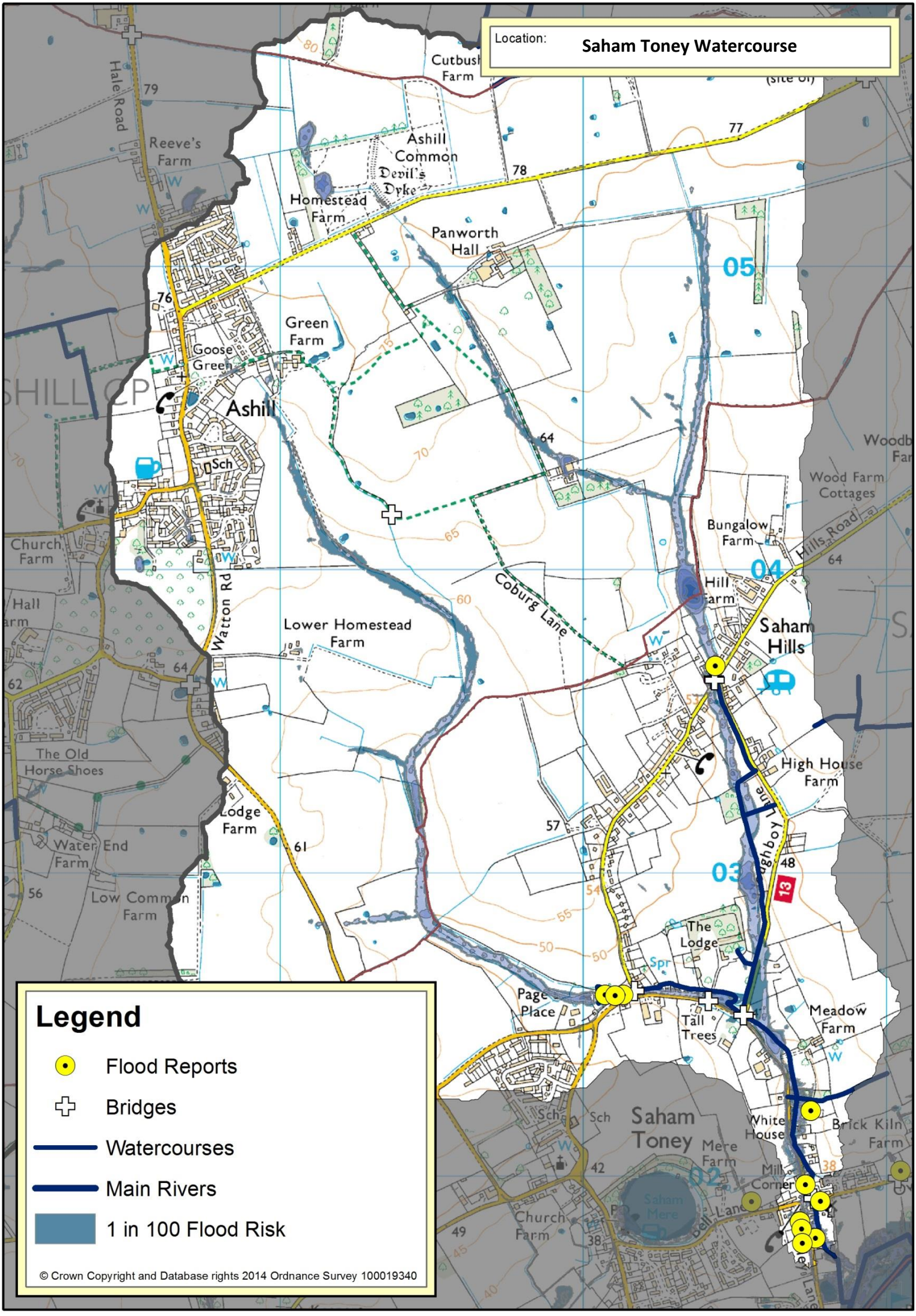
The flood investigation report aims to:

- 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.


Location:
Saham Toney Watercourse
Legend
Flood Reports
Bridges
Watercourses
Main Rivers
1 in 100 Flood Risk
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340
Ashill
Ashill Common
Devil's Dyke
Homestead Farm
Panworth Hall
Green Farm
Goose Green
Reeve's Farm
Hale Road
Cutbush Farm
Church Farm
Watton Rd
Lower Homestead Farm
Coburg Lane
Lodge Farm
The Old Horse Shoes
Water End Farm
Low Common Farm
Bungalow Farm
Hill Farm
Saham Hills
Wood Farm Cottages
Hills Road
High House Farm
Broughboy Lane
The Lodge
Page Place
Tall Trees
Meadow Farm
Saham Toney
Mere Farm
White House
Brick Kiln Farm
Mill Corner
Church Farm
Saham Mere
Bell Lane
01
02
03
04
05
13

Flooding and flood risk within the Saham Toney Watercourse Catchment

Description of catchment

This catchment covers a large area of land to the North of Saham Toney. The topography generates two watercourses that converge at the junction of Ploughboy Lane and Chequers Lane. The flooding in this catchment was concentrated in three locations, near to both the watercourses North of the village and also downstream of the point of confluence.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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	37	2
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	0	63	2
[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 25 reports of external and internal flooding have been received. Out of these 25 reports 12 incidents of internal flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 4 properties were internally flooded on **Cley Lane**, Saham Toney. These incidents were reported by: • a resident via email correspondence on the 28 June 2016, (FWF/16/3/2871) • a resident via personal communication on the 5 September 2016, (FWF/16/3/3270), (FWF/16/3/3271) • a resident via personal communication on the 31 January 2017, (FWF/16/3/4307)	• The Fire and Rescue Service visited three of the affected residences to offer advice and to gather information during the incident. • Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. • Anglian Water Services Ltd visited one residence to investigate a pollution issue linked to the flooding incident. • Norfolk County Council (Highways) carried out measures to minimise the impact of flooding after the incident.
On the 23/06/2016 - 3 properties were internally flooded on **Pages Lane**, Saham Toney. These incidents were reported by: • a resident via email correspondence on the 29 June 2016, (FWF/16/3/2864) • the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/3/3385) • a resident via personal communication on the 31 January 2017, (FWF/16/3/4313)	• The Fire and Rescue Service visited one of the affected residences to offer advice and to gather information during the incident. • Norfolk County Council (Lead Local Flood Authority and Highways) visited affected residents to offer advice and to gather information after the incident. • Norfolk County Council (Highways) carried out measures to minimise the impact of flooding after the incident.
On the 23/06/2016 - 1 property was internally flooded on **Hills Road**, Saham Toney. This incident was reported by a resident via an online flood report form on the 6 August 2016, (FWF/16/3/3126)	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. • Norfolk County Council (Highways) carried out measures to minimise the impact of flooding after the incident.
On the 23/06/2016 - 2 properties were internally flooded on **Chequers Lane**, Saham Toney. These incidents were reported by: • a resident via an online flood report form on the 15 August 2016, (FWF/16/3/3181) • Breckland District Council via email correspondence on the 18 July 2016, (FWF/16/3/3862)	• The Fire and Rescue Service visited affected residents to offer advice and to gather information during the incident. • Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.
On the 23/06/2016 - 1 property was internally flooded on **Ovington Road**, Saham Toney. This incident was reported by a resident via a flood questionnaire on the 12 September 2016, (FWF/16/3/3525)	• No authority visited the affected property however Norfolk County Council (Lead Local Flood Authority) contacted resident to offer advice and to gather information after the incident.
On the 23/06/2016 - 1 property was internally flooded on **Church Road**, Ashill. This incident was reported by a	

resident via an online flood report form on the 22 July 2016, (FWF/16/3/3022)	• 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 during the incident.

Recent rainfall within the catchment

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

Historic flooding incidents within the catchment

One resident stated that there had been minor external flooding experienced approximately one month prior to the flood event. During the investigation no other information highlighting historic flooding issues within this catchment has been provided.

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
Cley Lane, Saham Toney, 23/06/2016 Pages Lane, Saham Toney, 23/06/2016 Hills Road, Saham Toney, 23/06/2016 Chequers Lane, Saham Toney, 23/06/2016 Ovington Road, Saham Toney, 23/06/2016	Run-off from significant rainfall across the catchment was directed along flow paths towards the surface water drainage network and the watercourse. These flows could not be accommodated by the receiving watercourse which led to the overloading of connecting drainage. Flows that could not be accommodated by the watercourse and drainage system found their way into the affected properties. The evidence provided by residents when compared against risk mapping suggests the rainfall event experienced on the 23 June 2016 would be classed as significant and beyond the capacity of existing drainage provision.	Property owners, Land owners, Riparian owners, Anglian Water, Norfolk County Council
Church Road, Ashill, 23/06/2016	Run-off from significant rainfall across the catchment was directed along flow paths on which the property was situated.	Property owners
Cley Lane, Saham Toney, 23/06/2016 Pages Lane, Saham Toney, 23/06/2016 Hills Road, Saham Toney, 23/06/2016 Chequers Lane, Saham Toney, 23/06/2016 Ovington Road, Saham Toney, 23/06/2016	Surface run-off flowed onto the highway and then was conveyed via dropped kerbs onto the accesses of the properties, which contributed to the concentration of flooding at the affected properties. At many locations the depth and significance of flooding also breeched other boundary features.	Property owners Highway authority
All locations within the catchment, 23/06/2016	The flood water entered many of the properties through the unprotected structure of the building. This included via features such as low thresholds at entrances, unprotected air bricks and services conduits.	Property owners
Cley Lane, Saham Toney, 23/06/2016 Hills Road, Saham Toney, 23/06/2016 Chequers Lane, Saham Toney, 23/06/2016	Significant rainfall made its way into the foul sewer system via unsealed manholes and property connections causing it to surcharge elsewhere. This surcharging contributed to the flooding at a number of the affected properties.	Anglian Water Property owners
Pages Lane, Saham Toney, 23/06/2016 Church Road, Ashill, 23/06/2016	The loss of drainage features within the catchment (such as dykes, ditches, ponds) and the amendments of principal drains and watercourses through straightening, embanking and culverting exacerbated the impact of flooding. It was reported by one resident that the obstruction of a culvert reduced the resilience of the drainage system to the flood event.	Riparian owners

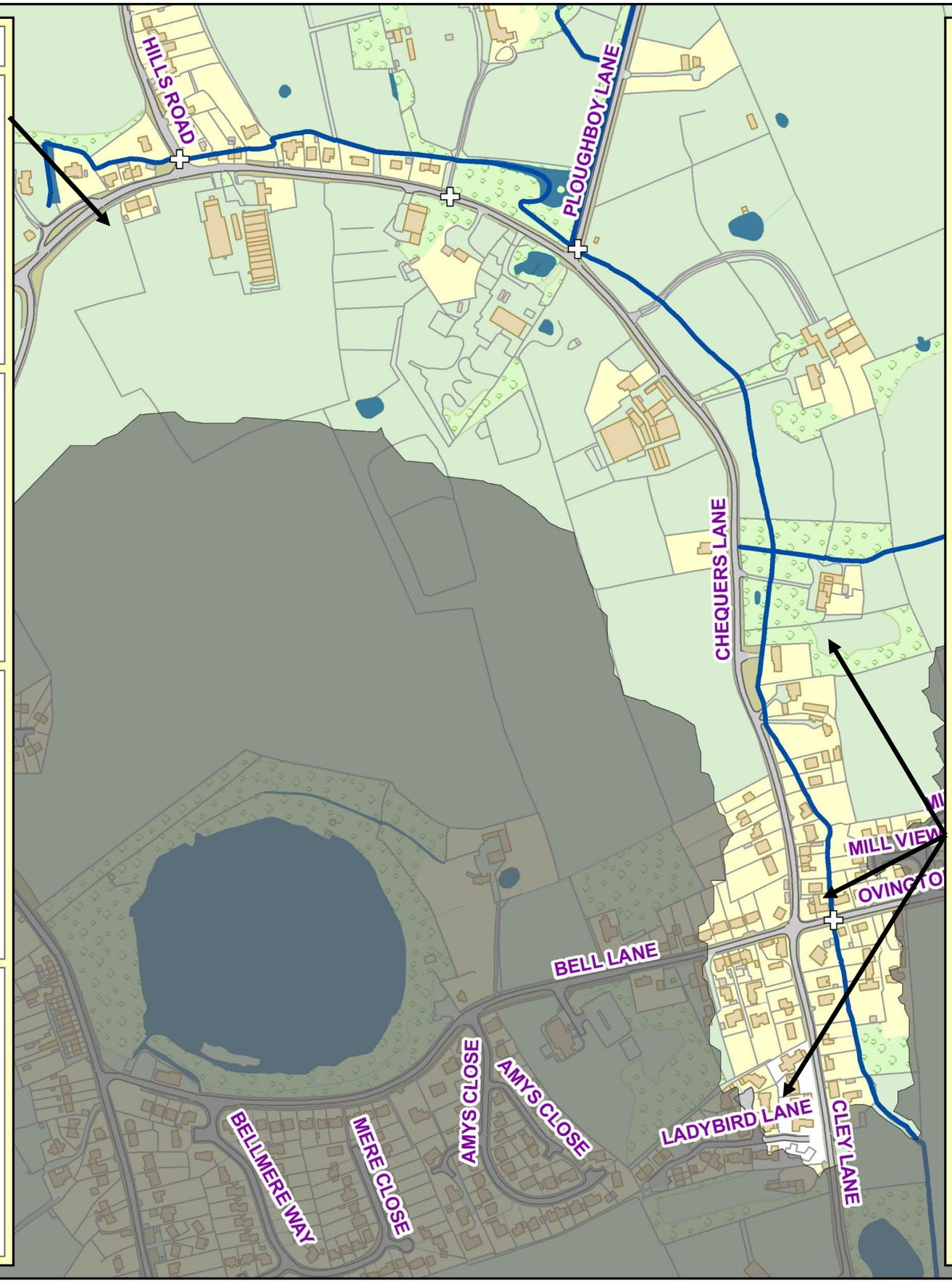
Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
Cley Lane, Saham Toney, 23/06/2016 Pages Lane, Saham Toney, 23/06/2016 Hills Road, Saham Toney, 23/06/2016 Chequers Lane, Saham Toney, 23/06/2016 Ovington Road, Saham Toney, 23/06/2016	Norfolk County Council will 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.	Norfolk County Council, Property owners	12 months
Cley Lane, Saham Toney, 23/06/2016 Pages Lane, Saham Toney, 23/06/2016 Hills Road, Saham Toney, 23/06/2016 Chequers Lane, Saham Toney, 23/06/2016 Ovington Road, Saham Toney, 23/06/2016	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, Property owners	12 months
Pages Lane, Saham Toney, 23/06/2016	Norfolk County Council would seek to remind riparian owners of their responsibility to undertake appropriate levels of maintenance to sustain the efficiency of the drainage systems.	Norfolk County Council, Riparian owners	12 months
Pages Lane, Saham Toney, 23/06/2016	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.	Anglian Water	12 months
Cley Lane, Saham Toney, 23/06/2016 Hills Road, Saham Toney, 23/06/2016 Chequers Lane, Saham Toney, 23/06/2016	Property owners should remove any inappropriate surface water connections to the foul sewer system and direct flows to alternative points of discharge.	Property owners	12 months
Church Road, Ashill, 23/06/2016	Property owners should approach landowners to seek improvements in land management to reduce the levels of run-off from agricultural land.	Property owners	12 months

Flood and Drainage Details

Hills Road and Pages Lane – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse. Run-off also directed onto the road that conveyed flows onto property accesses.

Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities. Riparian owners to maintain watercourse.



Location: **Saham Toney Watercourse**

External flooding – 15 other reports of external or unconfirmed internal flooding were also received.

The majority of these were located near to the confirmed internal flooding incidents.

1 of the reports was for an unconfirmed incident that occurred in Ashill.

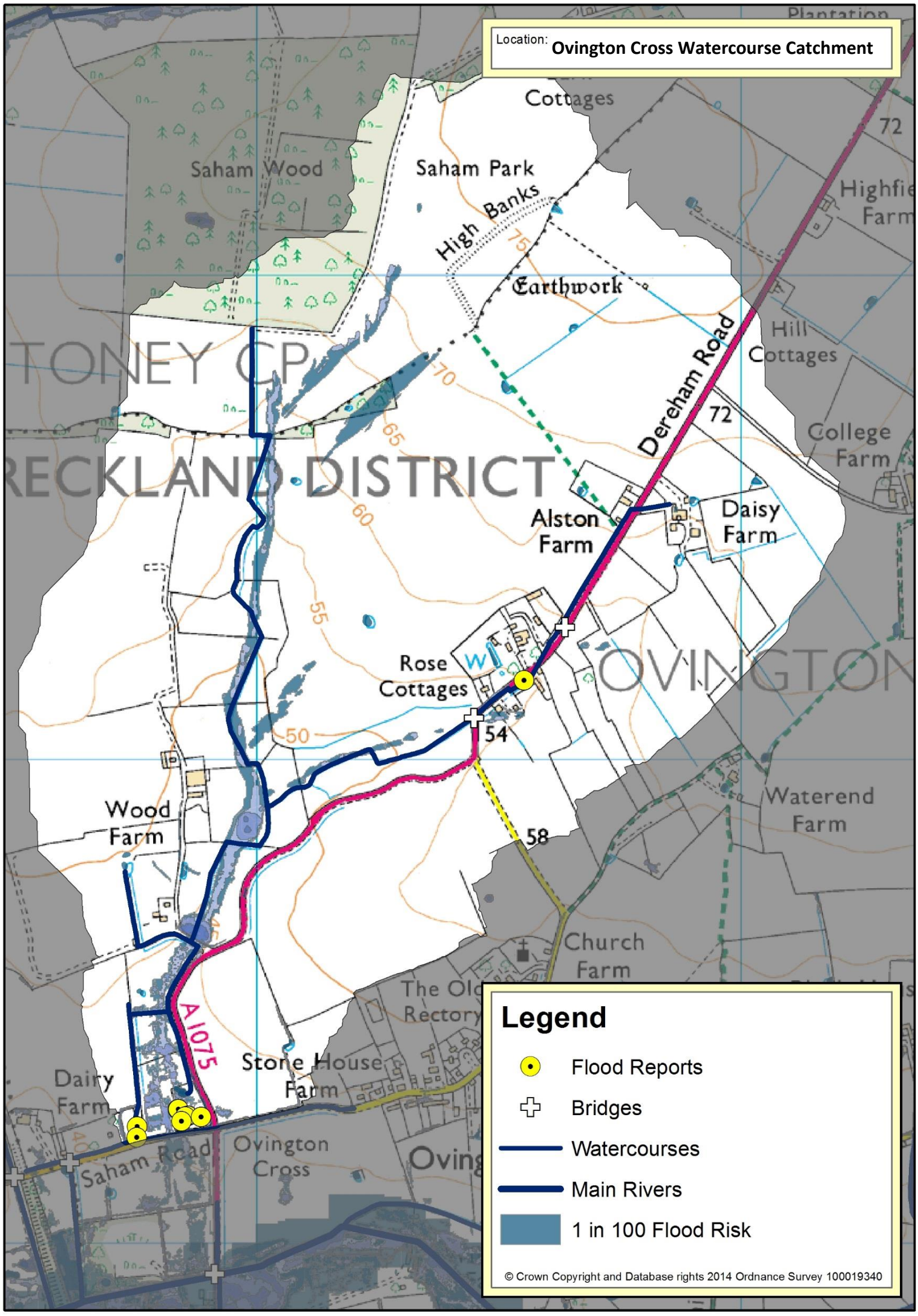
Chequers Lane and Cley Lane – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse. Run-off also directed onto the road that conveyed flows onto property accesses.

Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities. Riparian owners to maintain watercourse.

Legend

- Bridges
- Water bodies
- Watercourses
- Main Rivers


Location: Ovington Cross Watercourse Catchment
Saham Wood
Saham Park
High Banks
Earthwork
Cottages
Hill Cottages
Dereham Road
College Farm
Highfie Farm
Alston Farm
Daisy Farm
Rose Cottages
Wood Farm
Waterend Farm
Church Farm
The Old Rectory
Stone House Farm
Dairy Farm
Saham Road
Ovington Cross
A1075
TONEY CP
RECKLAND DISTRICT
OVINGTON
72
75
70
65
60
55
50
54
58
Legend
Flood Reports
Bridges
Watercourses
Main Rivers
1 in 100 Flood Risk
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340

Flooding and flood risk within the Ovington Cross Watercourse Catchment

Description of catchment

This catchment covers a large area of land to the North of Ovington. The topography is largely rural and generates two watercourses that converge North of Saham Road. The flooding in this catchment occurred primarily near to Saham Road however one incident occurred in the North East of the catchment.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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	4	3
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	0	7	4
[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 10 reports of external and internal flooding have been received. There was also reportedly flooding that affected highway users on the A1075. Pages laOut of these 10 reports 9 incidents of internal flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 7 properties were internally flooded on **Saham Road**, Ovington. These incidents were reported by: • a resident via email correspondence on the 28 June 2016, (FWF/16/3/2874) • a resident via email correspondence on the 7 September 2016, (FWF/16/3/3246) • a resident via email correspondence on the 7 September 2016, (FWF/16/3/3268) • a member of the public via personal communication on the 5 September 2016, (FWF/16/3/3269) • a resident via personal communication on the 1 February 2017, (FWF/16/3/4242) • a resident via personal communication on the 1 February 2017, (FWF/16/3/4243) • a resident via personal communication on the 1 February 2017, (FWF/16/3/4244)	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. • Norfolk County Council (Lead Local Flood Authority) carried out measures to minimise the impact of flooding after the incident. • The Fire and Rescue Service attended motorists stranded in a car on Saham Road.
On the 23/06/2016 - 2 properties were internally flooded on **Dereham Road**, Ovington. These incidents were reported by: • the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/3/3300) • Norfolk County Council (Highways) via an electronic report on the 27 June 2016, (FWF/16/3/3947)	• The Fire and Rescue Service visited affected residents to offer advice and to gather information during the incident. • 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

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
25/06/2007	Flash flooding. Unclear as to impact but one resident undertook property level works to protect property after event.	Unknown

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
Saham Road, Ovington, 23/06/2016 Dereham Road, Ovington, 23/06/2016	Run-off from significant rainfall across the catchment was directed along flow paths towards the surface water drainage network and the watercourse. These flows could not be accommodated by the receiving watercourse which led to the overloading of connecting drainage. Flows that could not be accommodated by the watercourse and drainage system found their way into the affected properties that are located across the flow path. The evidence provided by residents when compared against risk mapping suggests the rainfall event experienced on the 23 June 2016 would be classed as significant and beyond the capacity of existing drainage provision.	Property owners, Land owners, Riparian owners, Anglian Water, Norfolk County Council
Saham Road, Ovington, 23/06/2016 Dereham Road, Ovington, 23/06/2016	The flood water entered many of the properties through the unprotected structure of the building. This included via features such as low thresholds at entrances, unprotected air bricks and services conduits.	Property owners
Saham Road, Ovington, 23/06/2016 Dereham Road, Ovington, 23/06/2016	Surface run-off flowed onto the highway from surrounding land and was conveyed along it until egressing at low points such as field boundaries or property accesses.	Property owners Highway authority

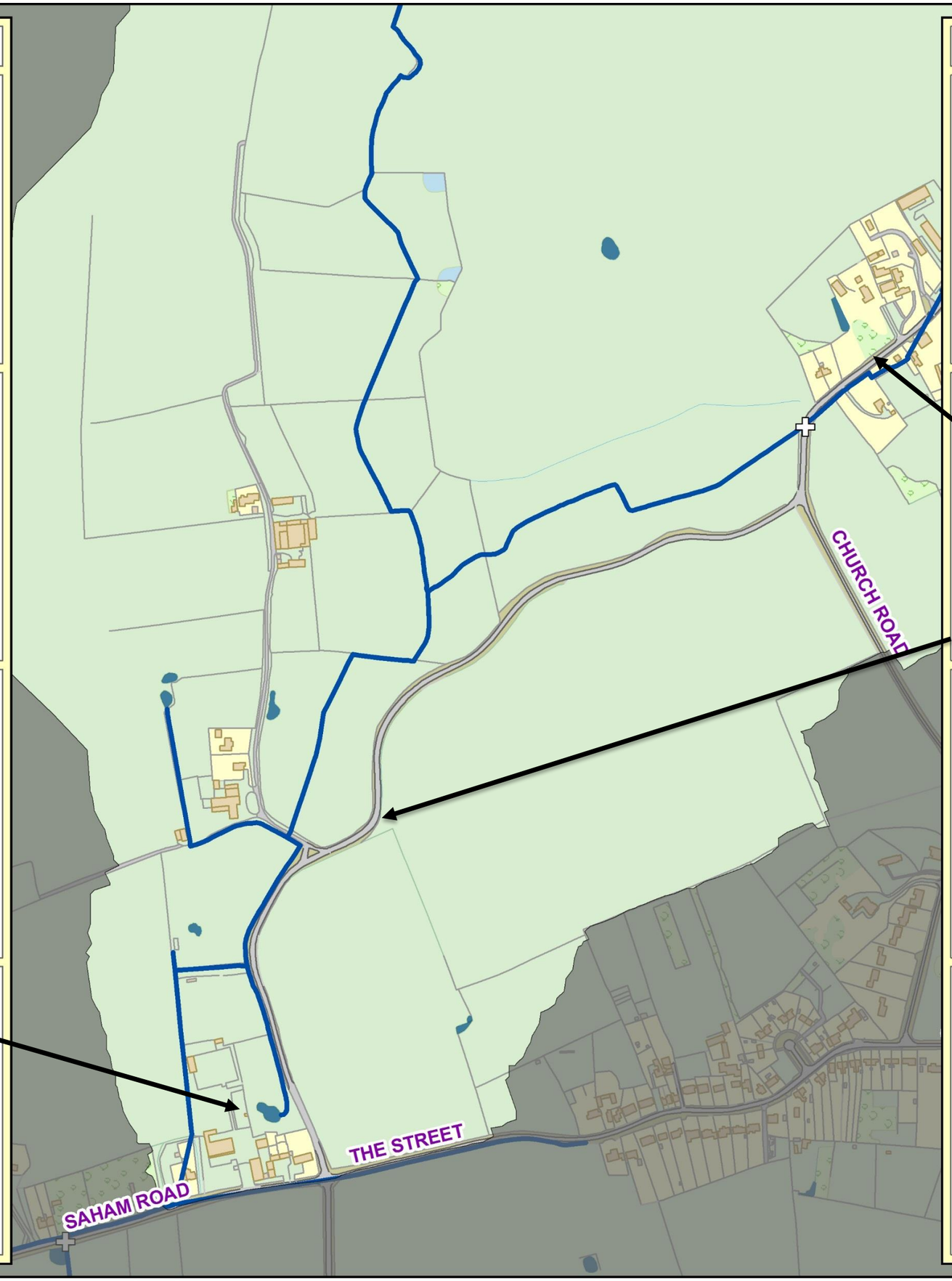
Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
Saham Road, Ovington, 23/06/2016 Dereham Road, Ovington, 23/06/2016	Norfolk County Council will work with partner organisations to identify funding for flood mitigation. This would include assessing 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.	Norfolk County Council, Property owners	12 months
Saham Road, Ovington, 23/06/2016 Dereham Road, Ovington, 23/06/2016	Norfolk County Council would seek to remind riparian owners of their responsibility to undertake appropriate levels of maintenance to sustain the efficiency of the drainage systems.	Norfolk County Council, Riparian owners	12 months
Saham Road, Ovington, 23/06/2016 Dereham Road, Ovington, 23/06/2016	NCC Highways could 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.	Norfolk County Council, Property owners	12 months

Flood and Drainage Details

Saham Road – Internal and external flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse and flow into properties positioned across the flow path.

Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities. Riparian owners to maintain watercourse.



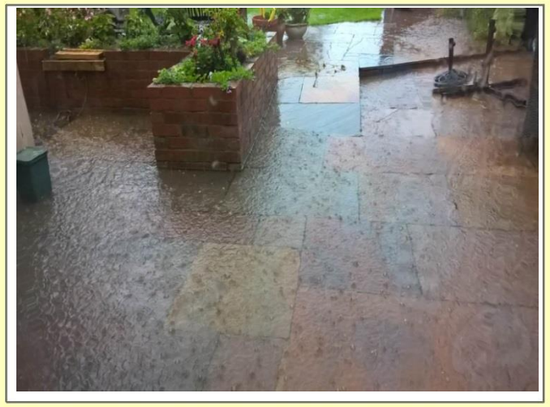
Location: **Ovington Cross Watercourse**

Dereham Road – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse and flow into properties positioned across the flow path.

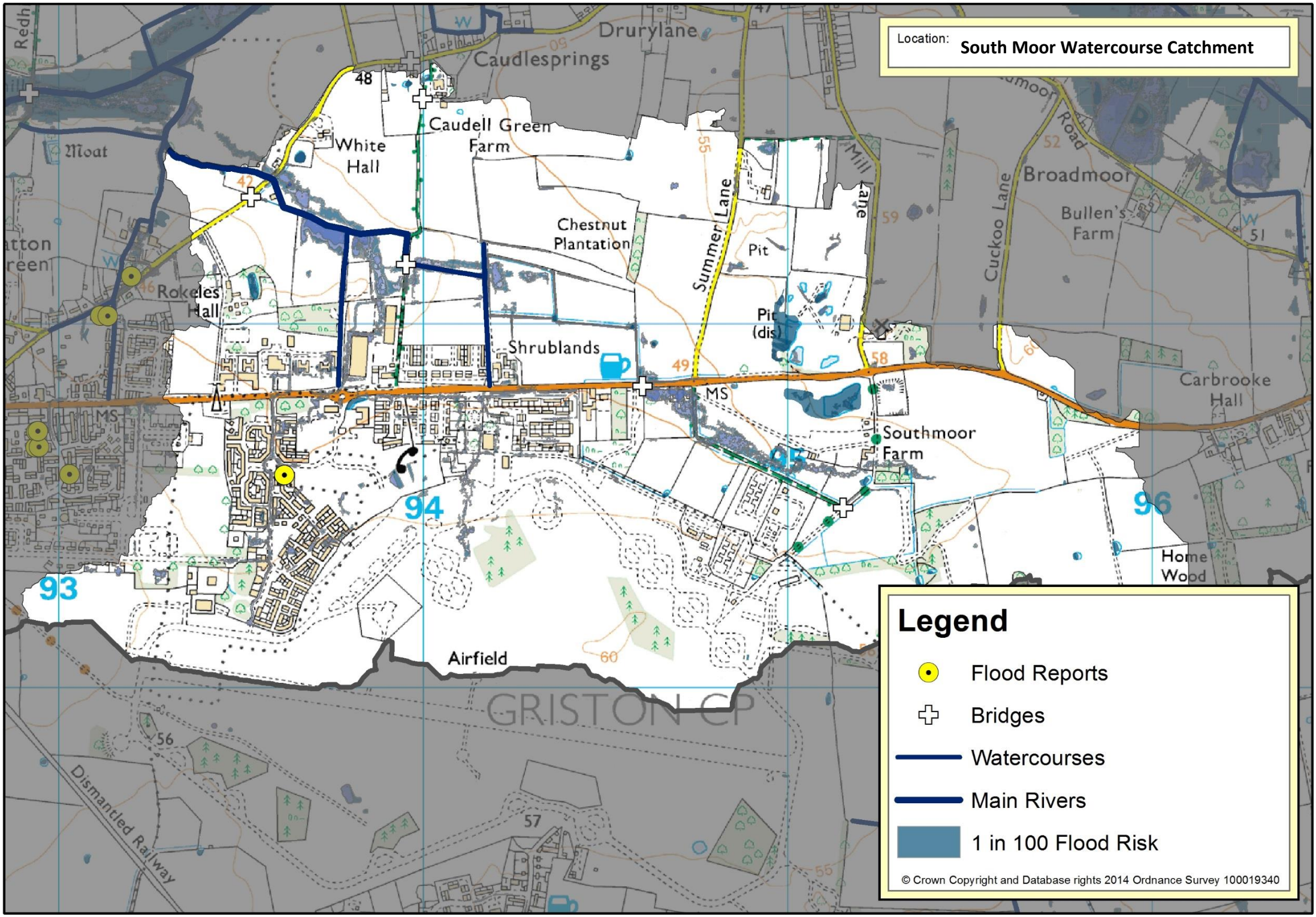
Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities. Riparian owners to maintain watercourse.

A1075 – Flooding affecting highways users.



Legend

- Bridges
- Water bodies
- Watercourses
- Main Rivers


Location:
South Moor Watercourse Catchment
Drurylane
Caudlesprings
Caudell Green Farm
White Hall
Moat
Rokeles Hall
Chestnut Plantation
Summer Lane
Mill Lane
Pit
Pit (dis)
Shrublands
Broadmoor
Cuckoo Lane
Bullen's Farm
Carbrooke Hall
Southmoor Farm
Home Wood
Airfield
GRISTON CP
Dismantled Railway
93
94
95
96
MS
Legend
Flood Reports
Bridges
Watercourses
Main Rivers
1 in 100 Flood Risk
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340

Flooding and flood risk within the South Moor Watercourse Catchment

Description of catchment

This catchment drains South East to North West and is bisected by Norwich Road. Whilst the catchment directs flows to a tributary of Watton Brook the majority of flood risk is from surface water flows in the built up area.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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	37	15
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	0	95	18
[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 2 reports of external and internal flooding have been received. Out of these 2 reports 1 incident of internal flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 1 property was internally flooded on **Lancaster Avenue**, Griston. This incident was reported by Breckland District Council via email correspondence on the 18 July 2016, (FWF/16/3/3864)	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. • Norfolk County Council (Highways) carried out measures to minimise the impact of flooding after the incident.

Recent rainfall within the catchment

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	One resident reported historic flooding having occurred but did not state when or what the impact of the incident was.	Unknown

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
Lancaster Avenue, Griston, 23/06/2016	Run-off from significant rainfall pooled at a low point within the catchment affecting the property.	Property owners
Lancaster Avenue, Griston, 23/06/2016	Run-off from significant rainfall was obstructed by man-made constructions (walls, fencing, ramping) which directed flood water toward the affected property.	Property owners
Lancaster Avenue, Griston, 23/06/2016	The flood water entered many of the properties through the unprotected structure of the building. This included via features such as low thresholds at entrances, unprotected air bricks and services conduits.	Property owners

Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
Lancaster Avenue, Griston, 23/06/2016	Norfolk County Council will 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.	Norfolk County Council, Property owners	12 months
Lancaster Avenue, Griston, 23/06/2016	Property owners should determine if works are needed to remove the risk posed by structures that form obstructions to flows.	Property owners	12 months
Lancaster Avenue, Griston, 23/06/2016	Property owners could protect their buildings through flood protection measures where appropriate. Norfolk County Council will 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.	Property owners	12 months

Location: **South Moor Watercourse Catchment**

Flood Events and Flood Risk

WATTON GREEN

AKROTIRI SQUARE

CHANGI ROAD

NORWICH ROAD

NORWICH ROAD SERVICE ROAD

NEWALL AVENUE

WESSEX DRIVE

BIGGIN HILL WAY

WASHINGTON DRIVE

WELLINGTON ROAD

CANBERRA ROAD

FORTRESS ROAD

External flooding – 1 other reports of external or unconfirmed flooding was received on **Beverley Close**.

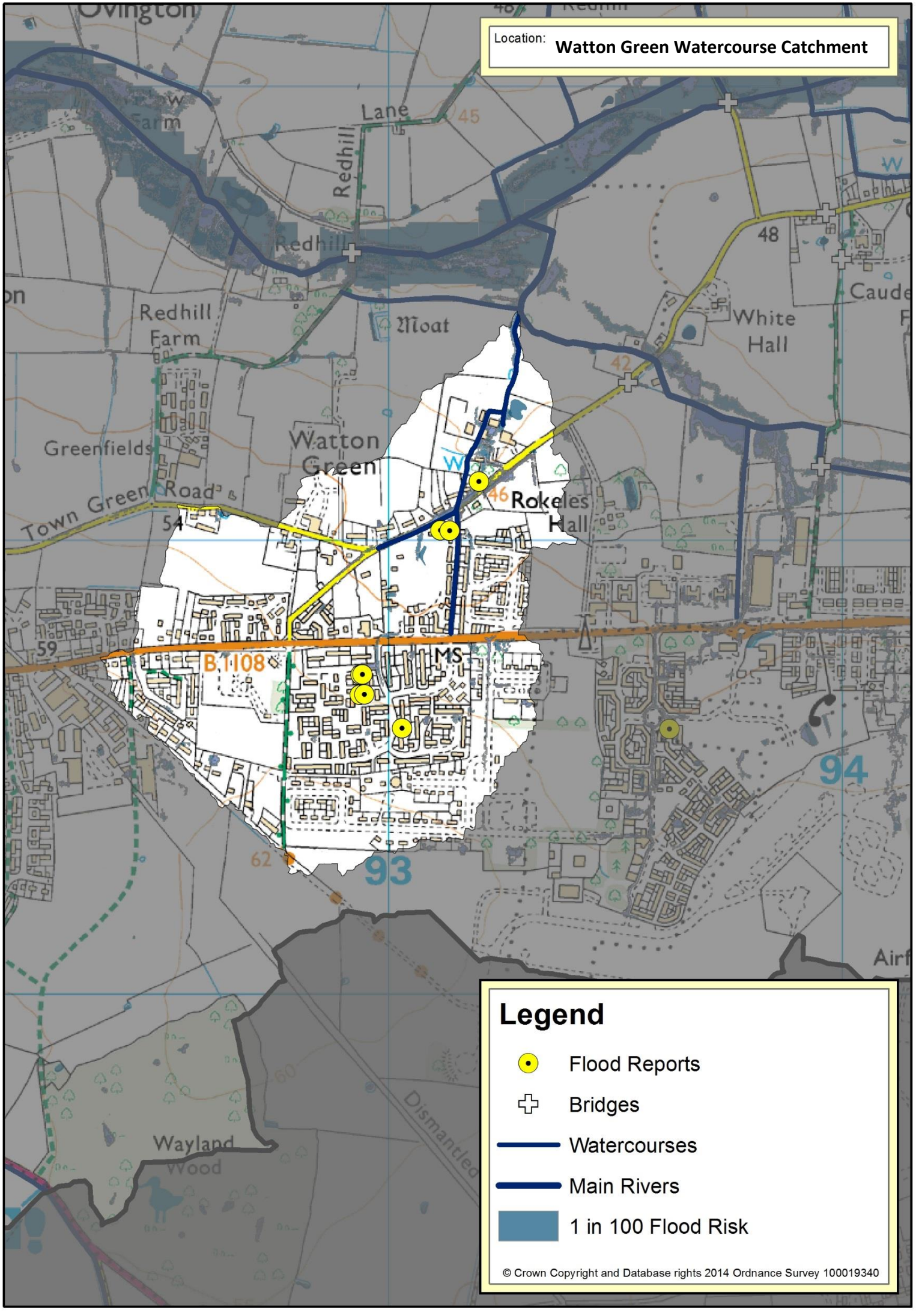
Lancaster Avenue – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to pool at a low point in the catchment. Surface water was obstructed by man-made features such as walls that direct flood water towards properties.

Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities. Property owners should protect their properties and amend or remove any obstructions to surface run-off.

Legend

- Bridges
- Water bodies
- Watercourses
- Main Rivers


Location:
Watton Green Watercourse Catchment
Redhill Lane
Redhill
Redhill Farm
Moat
White Hall
Greenfields
Watton Green
Town Green Road
Rokeles Hall
B 1108
MS
93
94
Wayland Wood
Dismantled
Legend
Flood Reports
Bridges
Watercourses
Main Rivers
1 in 100 Flood Risk
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340

Flooding and flood risk within the Watton Green watercourse Catchment

Description of catchment

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

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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	12	0
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	1	26	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 25 reports of external and internal flooding have been received. Out of these 25 reports 9 incidents of internal flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 5 properties were internally flooded on **Lovell Gardens**, Watton. These incidents were reported by: • Breckland District Council via an electronic report on the 18 July 2016, (FWF/16/3/3865), (FWF/16/3/3866). • the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/3/3304) • a resident via personal communication on the 25 January 2017, (FWF/16/3/4250), (FWF/16/3/4197).	• 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 visited affected residents to offer advice and to gather information during the incident.
On the 23/06/2016 - 3 properties were internally flooded on **Horseshoe Close**, Watton. These incidents were reported by: • Breckland District Council via an electronic report on the 18 July 2016, (FWF/16/3/3868) • a resident via personal communication on the 25 January 2017, (FWF/16/3/4185), (FWF/16/3/4184).	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.
On the 23/06/2016 - 1 property was internally flooded on **Watton Green**, Watton. This incident was reported by a resident via email correspondence on the 29 June 2016, (FWF/16/3/2951)	• No authority visited the affected property however Norfolk County Council (Lead Local Flood Authority) contacted resident to offer advice and to gather information after the incident.

Recent rainfall within the catchment

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
June/July/August 2009	Two residents reported flash flooding in Lovell Gardens occurring in 2009 with one resident stating it caused internal flooding.	Unknown
1976	Flash flooding in Lovell Gardens reported by a resident	Unknown

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
Lovell Gardens, Watton, 23/06/2016 Watton Green, Watton, 23/06/2016 Horseshoe Close, Watton, 23/06/2016	Run-off from significant rainfall was concentrated along overland flowpaths which cross green space, gardens, highway and the locations of the affected properties. The run-off experienced in Lovell Gardens is exacerbated by the large amount of hard standing that exists and the presence of some features such as walls that channel run-off towards the low points of the catchment where the affected properties are located.	
Lovell Gardens, Watton, 23/06/2016 Horseshoe Close, Watton, 23/06/2016 Watton Green, Watton, 23/06/2016	Significant rainfall was directed into the surface water and foul drainage networks. This caused the network to surcharge. Flows that exceeded the system's capacity contributed to the flooding.	
Lovell Gardens, Watton, 23/06/2016 Horseshoe Close, Watton, 23/06/2016 Watton Green, Watton, 23/06/2016	The flood water entered many of the properties through the unprotected structure of the building. This included via features such as low thresholds at entrances, unprotected air bricks and services conduits.	Property owners

Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
Lovell Gardens, Watton, 23/06/2016 Horseshoe Close, Watton, 23/06/2016 Watton Green, Watton, 23/06/2016	Norfolk County Council will 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.	Norfolk County Council	12 months
Lovell Gardens, Watton, 23/06/2016 Horseshoe Close, Watton, 23/06/2016 Watton Green, Watton, 23/06/2016	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.	Anglian Water	12 months

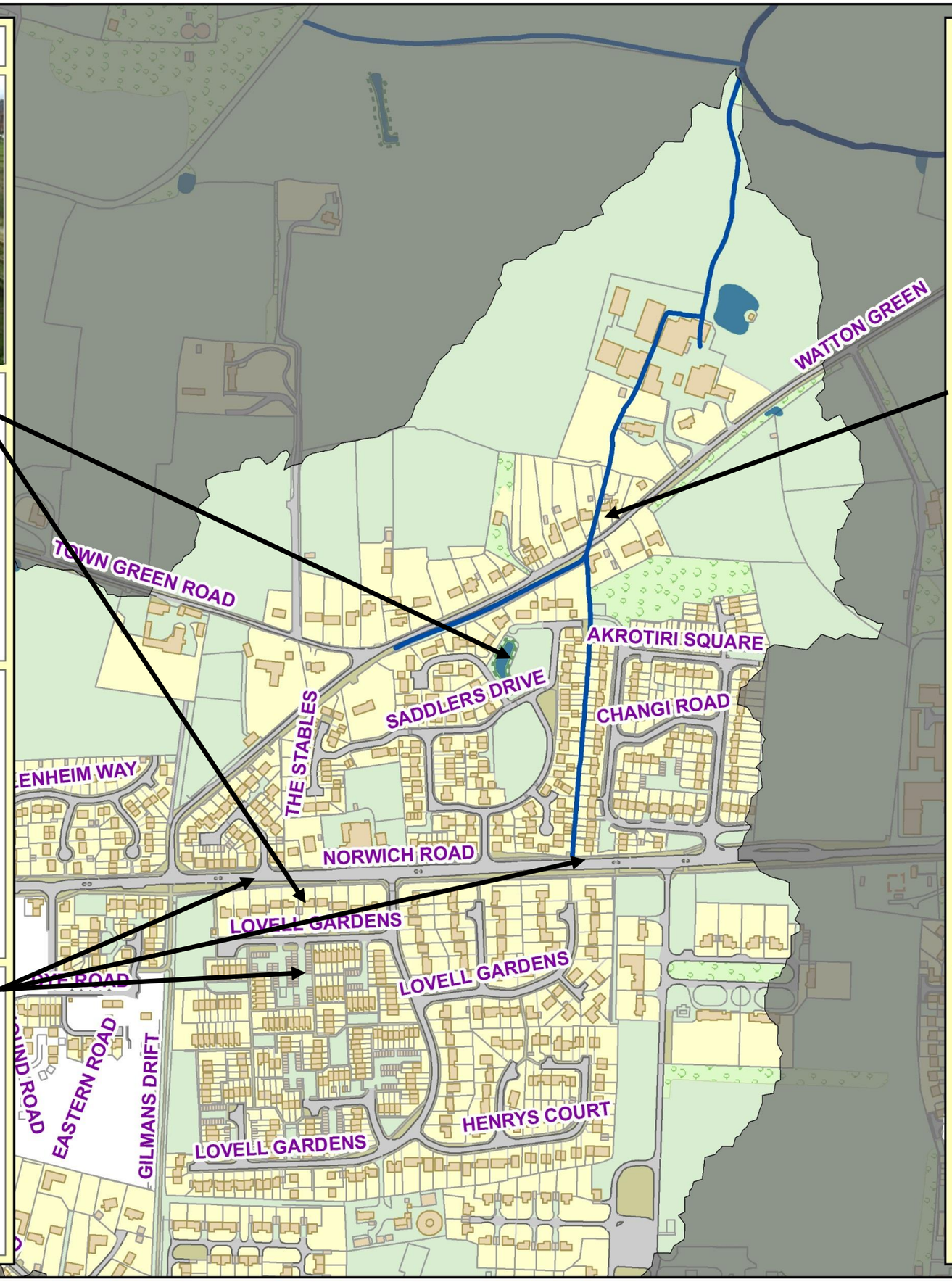
Flood Events and Flood Risk

Horseshoe Close and **Lovell Gardens** – Internal flooding experienced on 23 June 2016

Causes –Run-off from significant rainfall was concentrated along overland flowpaths which cross green space, gardens, highway and the locations of the affected properties

Recommendations – Norfolk County Council to explore funding for flood mitigation. Anglian Water to explore managing the amount of surface water entering their drainage system.

External flooding – 16 other reports of external or unconfirmed internal flooding were also received from Lovell Gardens, Norwich Road, Nicosia Court.



Location: **Watton Green Watercourse**

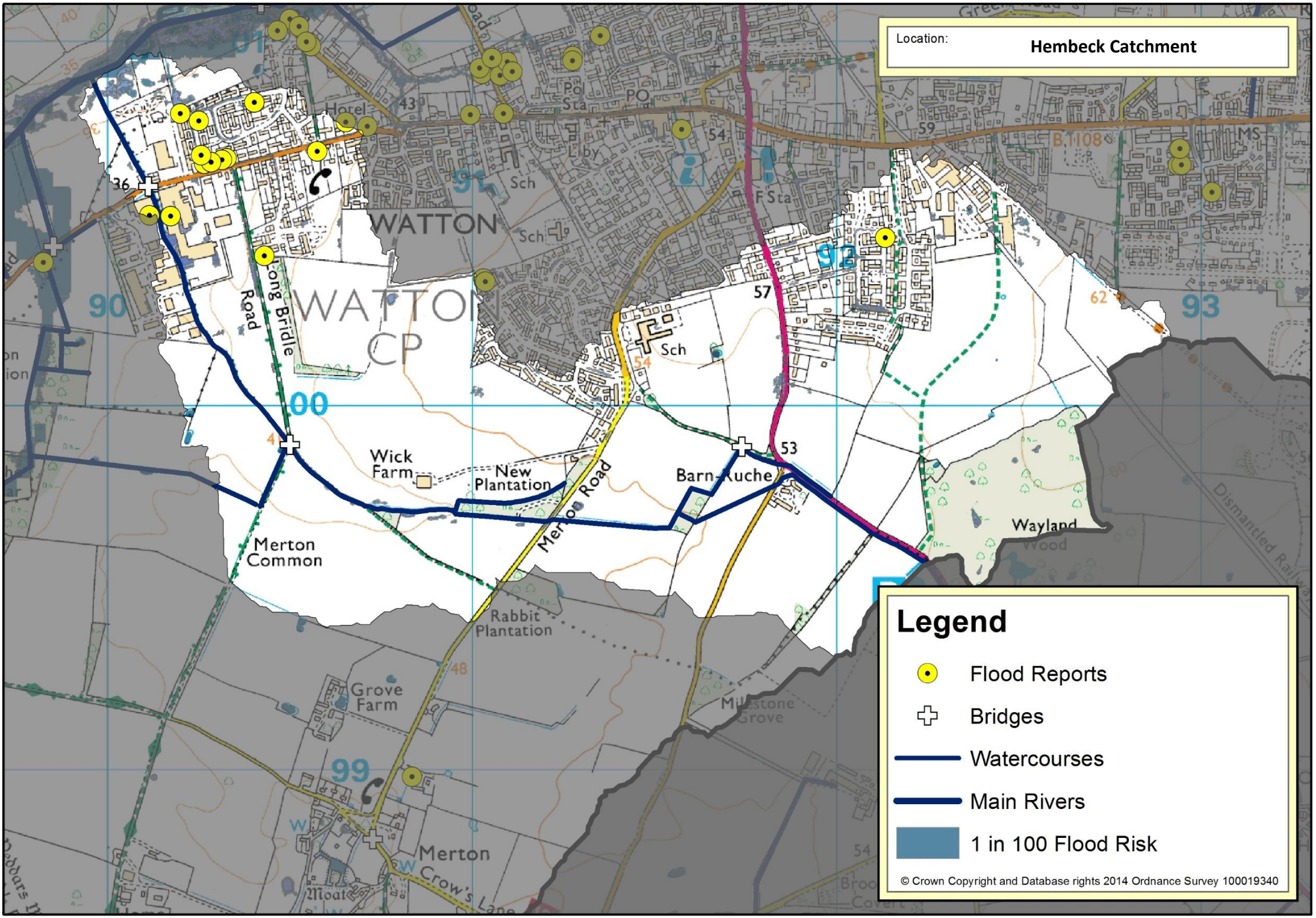
Watton Green – Internal flooding experienced on 23 June 2016

Causes –Run-off from significant rainfall was concentrated along overland flowpaths which cross green space, gardens, highway and the locations of the affected property

Recommendations – Norfolk County Council to explore funding for flood mitigation. Anglian Water to explore managing the amount of surface water entering their drainage system.

Legend

- Bridges
- Water bodies
- Watercourses
- Main Rivers


Location:
Hembeck Catchment
WATTON
WATTON CP
Long Bridle Road
Wick Farm
New Plantation
Merton Road
Barn Kuche
Merton Common
Rabbit Plantation
Grove Farm
Merton
Crow's Lane
Wayland Wood
Dismantled Railway
B1108
Legend
Flood Reports
Bridges
Watercourses
Main Rivers
1 in 100 Flood Risk
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340

Flooding and flood risk within the Hembeck Catchment

Description of catchment

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

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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	2	4
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	1	27	4
[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 34 reports of external and internal flooding have been received. Out of these 34 reports 13 incidents of internal flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 1 property was internally flooded on **Threxton Road Industrial Estate**, Little Cressingham. This incident was reported by a resident via an online flood report form on the 24 June 2016, (FWF/16/3/2801)	• No authority visited the affected property during the event however Norfolk County Council (Lead Local Flood Authority) contacted resident to offer advice and to gather information after the incident.
On the 23/06/2016 - 7 properties were internally flooded on **Brandon Road**, Watton. These incidents were reported by: • a Norfolk County Councillor via email correspondence on the 2 December 2016, (FWF/16/3/3802) • Breckland District Council via an electronic report on the 18 July 2016, (FWF/16/3/3867) • a resident via personal communication on the 25 January 2017, (FWF/16/3/4220) • a resident via personal communication on the 25 January 2017, (FWF/16/3/4228) • a resident via personal communication on the 1 February 2017, (FWF/16/3/4230) • a resident via personal communication on the 27 July 2016, (FWF/16/3/3190) • a resident via an online flood report form on the 5 July 2016, (FWF/16/3/3010)	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. • Anglian Water Services Ltd visited at least two of the affected residences to offer advice and to gather information after the incident. • Norfolk County Council (Highways) visited affected residents to offer advice and to gather information after the incident. • At least two properties had no authority visit however Norfolk County Council (Lead Local Flood Authority) contacted residents to offer advice and to gather information after the incident.
On the 23/06/2016 - 1 property was internally flooded on **Stokes Avenue**, Watton. This incident was reported by a resident via a telephone call on the 21 September 2016, (FWF/16/3/3371)	• No authority visited the affected property during the event however Norfolk County Council (Lead Local Flood Authority) contacted resident to offer advice and to gather information after the incident.
On the 23/06/2016 - 3 properties were internally flooded on **Langmere Road**, Watton. These incidents were reported by: • a resident via an online flood report form on the 3 July 2016, (FWF/16/3/2931) • a resident via email correspondence on the 24 July 2016, (FWF/16/3/3019) • a resident via an online flood report form on the 23 June 2016, (FWF/16/3/2800)	• Anglian Water Services Ltd visited affected residents to offer advice and to gather information after the incident. Anglian Water have also fitted a non-return valve to the sewer network serving one property on Langmere Road. • Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.
On the 23/06/2016 - 1 property was internally flooded on **Glebe Road**, Watton. This incident was reported by Breckland District Council via email correspondence on the 30 June 2016, (FWF/16/3/2968)	• No authority visited the affected property during the event however Norfolk County Council (Lead Local Flood Authority) contacted resident to offer advice and to gather information after the incident.

Recent rainfall within the catchment

12 of the incidents (92%) 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 - 47mm rainfall was recorded as falling in 3 hours 0 minutes at the Watton rainfall monitoring station. This intensity of rainfall for the total duration equates to a 46 year rainfall event.

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
31 August 2015	One resident reported external flooding experienced on this date.	Unknown
15 June 2009	Two residents reported previous flooding on this date. One reported external flooding of gardens, another that they had to carry out extensive work to their house following the event.	Unknown
Unknown date	Three residents stated that they had experienced flooding previously but did not state when or what the impact of these incidents was.	Unknown

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
Threxton Road Industrial Estate, Little Cressingham, 23/06/2016 Brandon Road, Watton, 23/06/2016 Stokes Avenue, Watton, 23/06/2016 Langmere Road, Watton, 23/06/2016 Glebe Road, Watton, 23/06/2016	Run-off from significant rainfall across the catchment was directed along flow paths towards the surface water drainage network and the watercourse. These flows could not be accommodated by the receiving watercourse which led to the overloading of connecting drainage. Flows that could not be accommodated by the watercourse and drainage system found their way into the affected properties. The evidence provided by residents when compared against risk mapping suggests the rainfall event experienced on the 23 June 2016 would be classed as significant and beyond the capacity of existing drainage provision.	Property owners, Land owners, Riparian owners, Anglian Water, Norfolk County Council
Threxton Road Industrial Estate, Little Cressingham, 23/06/2016	Flows within the watercourse exceeded the capacity of the culvert beneath Brandon Road which exacerbated the flow of flood water from the watercourse towards the adjacent properties. A number of outfalls into the watercourse were also covered by flood water and as such had a restricted discharge during the event.	Riparian owners Anglian Water Norfolk County Council
Threxton Road Industrial Estate, Little Cressingham, 23/06/2016 Brandon Road, Watton, 23/06/2016 Stokes Avenue, Watton, 23/06/2016 Langmere Road, Watton, 23/06/2016	Surface run-off from significant rainfall that had made its way onto private tracks, roads and the highway flowed onto the accesses of affected properties that were situated lower than these features.	Land owners Property owners Highways Authority
Threxton Road Industrial Estate, Little Cressingham, 23/06/2016 Brandon Road, Watton, 23/06/2016 Stokes Avenue, Watton, 23/06/2016 Langmere Road, Watton, 23/06/2016 Glebe Road, Watton, 23/06/2016	Significant rainfall was directed into the surface water and foul drainage networks. This caused the network to surcharge. Flows that exceeded the system's capacity contributed to the flooding.	Anglian Water Highways Authority
Brandon Road, Watton, 23/06/2016 Langmere Road, Watton, 23/06/2016	The loss of drainage features within the catchment (such as ditches) and the amendments of principal drains and watercourses through	Riparian owners

	straightening, embanking and culverting exacerbated the impact of flooding.	
All locations in this catchment, 23/06/2016	The flood water entered many of the properties through the unprotected structure of the building. This included via features such as low thresholds at entrances, unprotected air bricks and services conduits.	Property owners

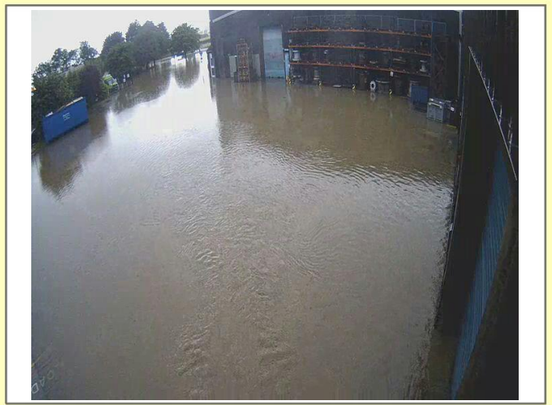
Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
Threxton Road Industrial Estate, Little Cressingham, 23/06/2016 Brandon Road, Watton, 23/06/2016 Stokes Avenue, Watton, 23/06/2016 Langmere Road, Watton, 23/06/2016 Glebe Road, Watton, 23/06/2016	Norfolk County Council will 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.	Norfolk County Council	12 months
Threxton Road Industrial Estate, Little Cressingham, 23/06/2016	Norfolk County Council will 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. Norfolk County Council would seek to remind riparian owners of their responsibility to undertake appropriate levels of maintenance to sustain the efficiency of the drainage systems.	Norfolk County Council	12 months
Threxton Road Industrial Estate, Little Cressingham, 23/06/2016 Brandon Road, Watton, 23/06/2016 Stokes Avenue, Watton, 23/06/2016 Langmere Road, Watton, 23/06/2016	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	12 months
Threxton Road Industrial Estate, Little Cressingham, 23/06/2016 Brandon Road, Watton, 23/06/2016 Stokes Avenue, Watton, 23/06/2016 Glebe Road, Watton, 23/06/2016	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.	Anglian Water	12 months

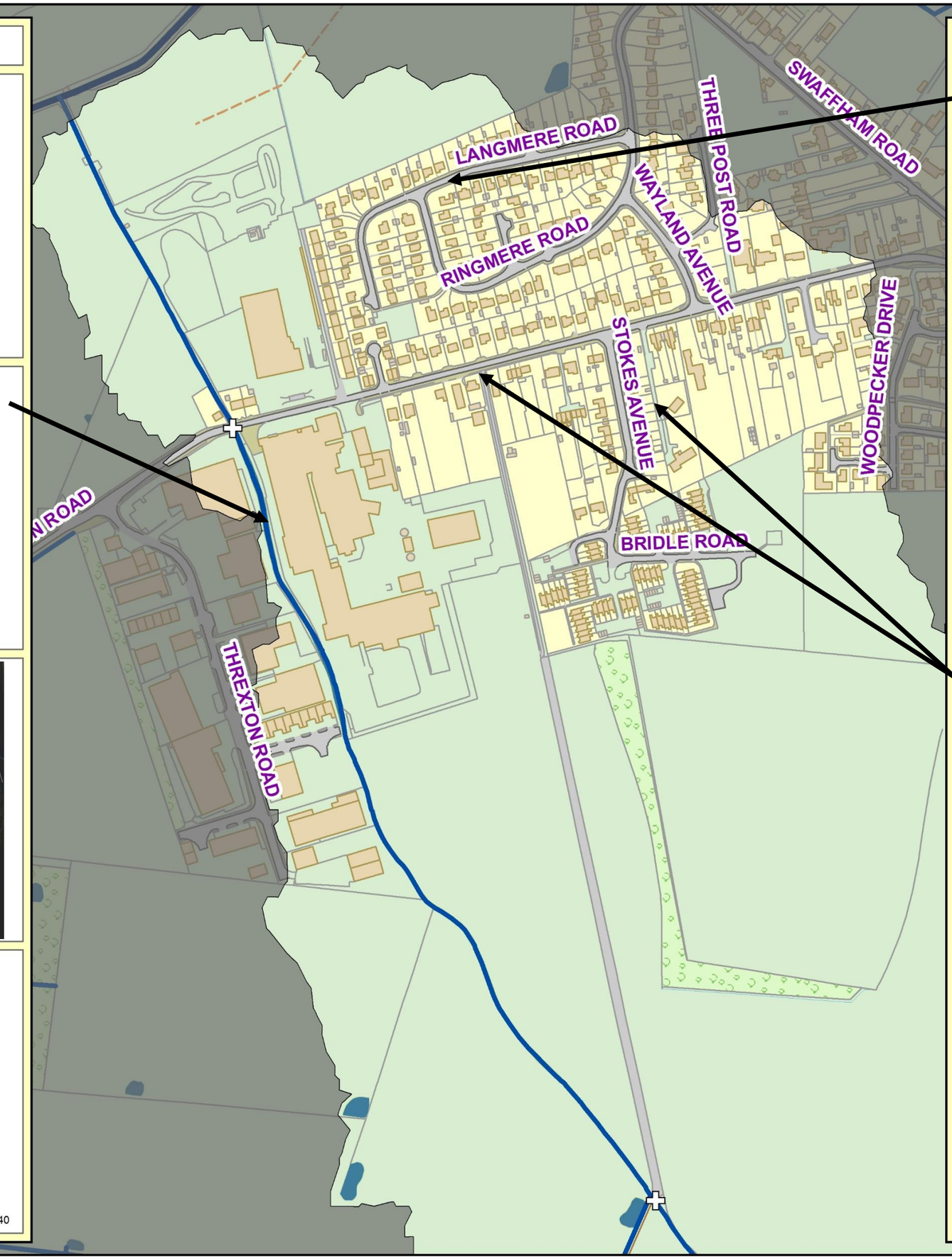
Flood Events and Flood Risk

Threxton Road Industrial Estate – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse and connected drainage.

Recommendations – Norfolk County Council to explore funding for flood mitigation and attenuation. Riparian owners to maintain watercourses. Role of obstructions on watercourses such as culvert to be assessed.





Legend

- Bridges
- Water bodies
- Watercourses
- Main Rivers

Location: **Hembeck Catchment**

Langmere Road – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to flow onto road and gardens and into properties.

Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities.

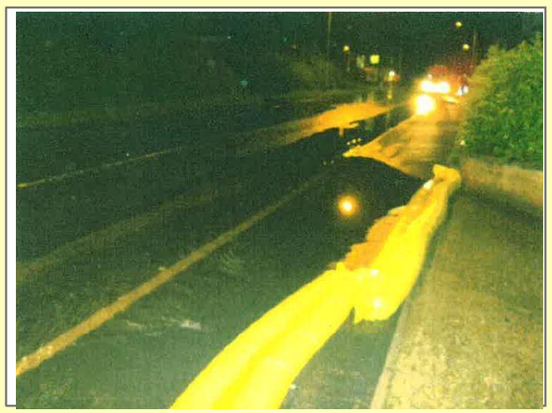
External flooding – 21 other reports of external or unconfirmed internal flooding were also received from Langmere Road, Priory Road, Monkhams Drive, Thetford Road, Abbey Road, Vicarage Walk, Ringmere Road, Brandon Road, Canon Close, Roman Drive.

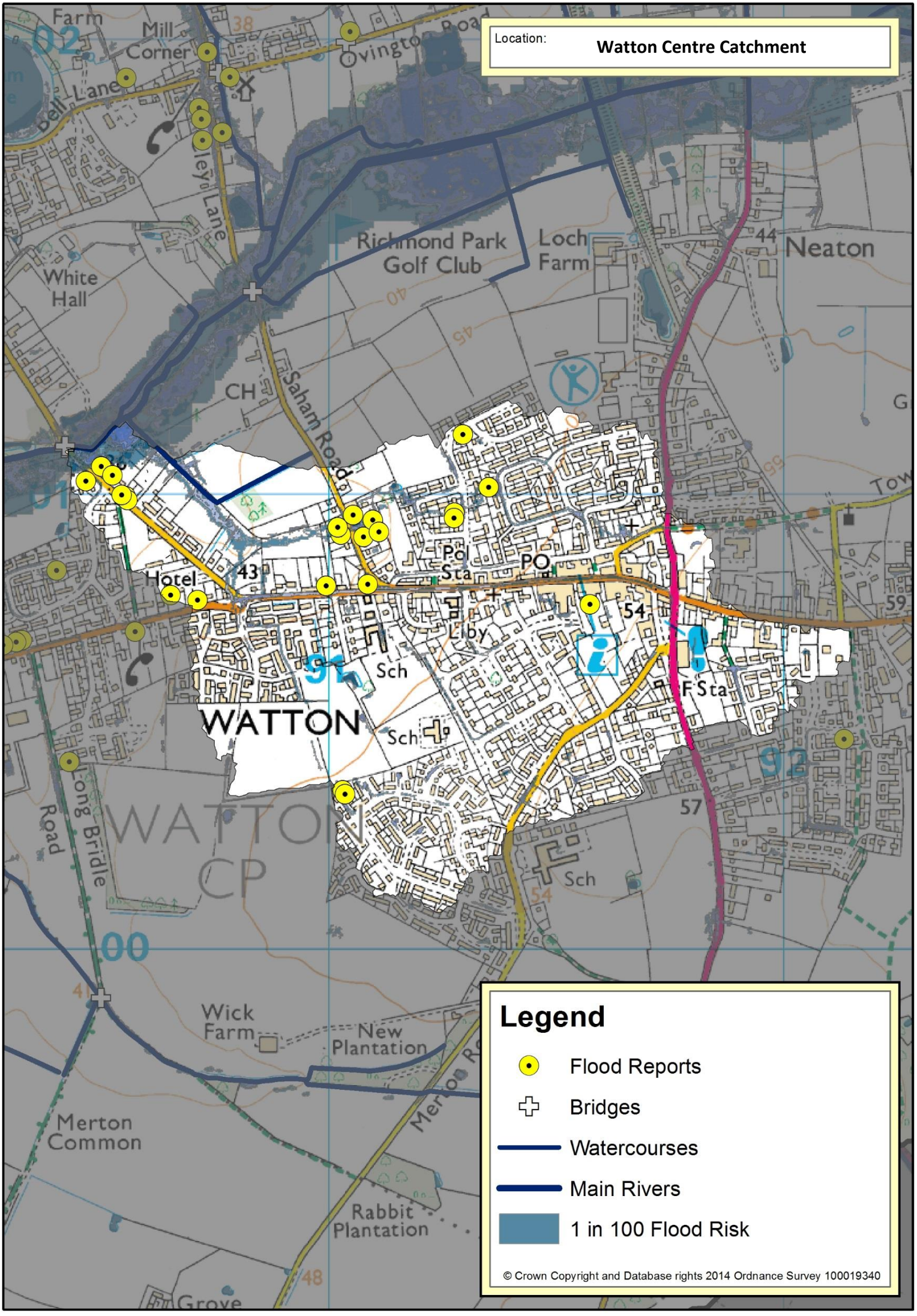
Causes – Significant rainfall caused run-off to flow onto roads, gardens and around properties.

Brandon Road and **Stokes Avenue** – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the ditches and drainage networks. Exceedance flows ran off onto private tracks and roads eventually flowing onto the highway and into properties positioned across the flow path.

Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities.




Location:
Watton Centre Catchment
WATTON
WATTON CP
Richmond Park Golf Club
Loch Farm
Neaton
White Hall
Saham Road
Hotel
Pol Sta
PO
Liby
Sch
F Sta
Long Bridle Road
Wick Farm
New Plantation
Merton Common
Rabbit Plantation
Grove
Legend
Flood Reports
Bridges
Watercourses
Main Rivers
1 in 100 Flood Risk
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340

Flooding and flood risk within the Watton Centre Catchment

Description of catchment

This catchment 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. The concentrations of flooding in this catchment are North of Norwich Road.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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	35	7
[b] No. of properties subject to surface water flood risk at 1 in 100 year event:	1	73	9
[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	1	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 40 reports of external and internal flooding have been received. Out of these 40 reports 23 incidents of internal flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 2 properties were internally flooded on **Jubilee Road**, Watton. These incidents were reported by: • Norfolk County Council (Highways) via an electronic report on the 24 June 2016, (FWF/16/3/3912) • a resident via a telephone call on the 12 September 2016, (FWF/16/3/3321)	• Norfolk County Council (Highways and Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.
On the 23/06/2016 - 3 properties were internally flooded on **Sharman Avenue**, Watton. These incidents were reported by: • Norfolk County Council (Highways) via an electronic report on the 13 December 2016, (FWF/16/3/4107), (FWF/16/3/4109) • the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/3/3283)	• 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 during the incident.
On the 23/06/2016 - 2 properties were internally flooded on **Saham Road**, Watton. These incidents were reported by: • residents via personal communication on the 25 January 2017, (FWF/16/3/4175), (FWF/16/3/4176)	• Norfolk County Council (Lead Local Flood Authority) and Anglian Water Services Ltd visited affected residents to offer advice and to gather information after the incident.
On the 23/06/2016 - 7 properties were internally flooded on **Swaffham Road**, Watton. These incidents were reported by: • a Norfolk County Councillor via email correspondence on the 9 February 2017, (FWF/16/3/4321) • residents via personal communication on the 1 February 2017, (FWF/16/3/4235), (FWF/16/3/4236), (FWF/16/3/4238), (FWF/16/3/4239) • the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/3/3290) • a resident via email correspondence on the 29 June 2016, (FWF/16/3/2867)	• 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 at least one residence during the incident and also provided advice to affected residents. • Police officers from Norfolk Constabulary attended during the event. • Officers from Breckland District Council visited affected residents to offer advice and to gather information after the incident.
On the 23/06/2016 - 4 properties were internally flooded on **Meadow Grove**, Watton. These incidents were reported by: • residents via personal communication on the 25 January 2017, (FWF/16/3/4177), (FWF/16/3/4179), (FWF/16/3/4178) • a resident via email correspondence on the 29 June 2016, (FWF/16/3/2919)	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.

On the 23/06/2016 - 3 properties were internally flooded on **Brandon Road**, Watton. These incidents were reported by: • a resident via personal communication on the 1 February 2017, (FWF/16/3/4233) • the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/3/3284) • a resident via email correspondence on the 24 August 2016, (FWF/16/3/3199)	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. • Norfolk County Council (Highways) undertook works after the event to repair road drainage. • The Fire and Rescue Service responded and pumped out at least one residence during the incident and also provided advice to affected residents.
On the 23/06/2016 - 1 property was internally flooded on **Nelson Court**, Watton. This incident was reported by Breckland District Council via email correspondence on the 28 June 2016, (FWF/16/3/2915)	• No authority visited the affected property during the event however Norfolk County Council (Lead Local Flood Authority) contacted resident to offer advice and to gather information after the incident.
On the 23/06/2016 - 1 property was internally flooded on **High Street**, Watton. This incident was reported by a resident via email correspondence on the 29 June 2016, (FWF/16/3/2947)	• No authority visited the affected property during the event however Norfolk County Council (Lead Local Flood Authority) contacted resident to offer advice and to gather information after the incident.

Recent rainfall within the catchment

12 of the incidents (52.2%) 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 - 47mm rainfall was recorded as falling in 3 hours 0 minutes at the Watton rainfall monitoring station. This intensity of rainfall for the total duration equates to a 46 year rainfall event.

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
15 June 2009	Three residents on Swaffham Road and one resident on Nelson Court reported flooding occurring on 15 June 2009. One of these residents indicated that this incident had flooded their property.	Unknown
2008	One resident report flooding occurring in 2008 however was unable to state when and what the impact of the incident was.	Unknown
1992	One resident on Swaffham Road reported minor internal flooding occurring in 1992.	Unknown

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
Jubilee Road, Watton, 23/06/2016 Sharman Avenue, Watton, 23/06/2016 Saham Road, Watton, 23/06/2016 Meadow Grove, Watton, 23/06/2016 Nelson Court, Watton, 23/06/2016 High Street, Watton, 23/06/2016	Run-off from significant rainfall that fell on the urban and green spaces within the catchment was concentrated along overland flowpaths on which the affected properties are positioned. This surface water run-off flowed along and across roads and through properties on its way towards the land drainage network and ultimately to Watton Brook.	Property owners, Land owners
Jubilee Road, Watton, 23/06/2016 Sharman Avenue, Watton, 23/06/2016 Swaffham Road, Watton, 23/06/2016 Brandon Road, Watton, 23/06/2016 Nelson Court, Watton, 23/06/2016	Surface run-off that had made its way onto the highway flowed onto the accesses of affected properties that were situated lower than the road.	Property owners Highway authority
Swaffham Road, Watton, 23/06/2016 Brandon Road, Watton, 23/06/2016	Significant rainfall was concentrated on the highway. Vehicles using the highway passed through the flood water causing it to wash towards the affected properties.	Users of the highway
Swaffham Road, Watton, 23/06/2016	Flows directed to local watercourses and Watton Brook could not be accommodated within their channels or at other constrictions such as culverts. Flows that could not be accommodated by the watercourses found their way into a number of properties.	Riparian owners
Jubilee Road, Watton, 23/06/2016 Sharman Avenue, Watton, 23/06/2016 Swaffham Road, Watton, 23/06/2016 Meadow Grove, Watton, 23/06/2016 Brandon Road, Watton, 23/06/2016 Nelson Court, Watton, 23/06/2016	Significant rainfall was directed into the surface water and foul drainage networks. This caused the network to surcharge. Flows that exceeded the system's capacity contributed to the flooding.	Anglian Water Highway Authority
All locations within this catchment, 23/06/2016	The flood water entered many of the properties through the unprotected structure of the building. This included via features such as low thresholds at entrances, unprotected air bricks and services conduits.	Property owners

Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
Jubilee Road, Watton, 23/06/2016 Sharman Avenue, Watton, 23/06/2016 Saham Road, Watton, 23/06/2016 Meadow Grove, Watton, 23/06/2016 Nelson Court, Watton, 23/06/2016 Swaffham Road, Watton, 23/06/2016 High Street, Watton, 23/06/2016	Norfolk County Council will 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.	Norfolk County Council, Property owners	12 months
Jubilee Road, Watton, 23/06/2016 Sharman Avenue, Watton, 23/06/2016 Swaffham Road, Watton, 23/06/2016 Brandon Road, Watton, 23/06/2016 Nelson Court, Watton, 23/06/2016	NCC Highways could consider opportunities to route flood water on the highway away from affected properties to alternative points of discharge, or other solutions as practicable. This could include opportunities to prevent water being pushed towards properties.	Norfolk County Council	12 months
Jubilee Road, Watton, 23/06/2016 Sharman Avenue, Watton, 23/06/2016 Swaffham Road, Watton, 23/06/2016 Meadow Grove, Watton, 23/06/2016 Brandon Road, Watton, 23/06/2016 Nelson Court, Watton, 23/06/2016	Anglian Water and Norfolk County Council should identify if methods of removing excess surface water to alternative points of discharge are required. This could include a range of mechanisms both within the existing drainage system as well as private property.	Anglian Water Norfolk County Council	12 months

Flood Events and Flood Risk

Swaffham Road – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to concentrate on flowpaths. Flows directed to the local watercourse and ditch network could not be accommodated.

Recommendations – Norfolk County Council to explore funding for flood mitigation, attenuation and flood routing.

Jubilee Road – Internal flooding experienced on 23 June 2016

Causes – Run-off from significant rainfall that fell on the urban and green spaces within the catchment was concentrated along overland flowpaths and roads on which the affected properties are positioned

Recommendations – Norfolk County Council to explore funding for flood mitigation, attenuation and flood routing.

Location: **Watton Centre Catchment**

Meadow Grove – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to concentrate on flowpaths and low points where the affected properties are located.

Recommendations – Norfolk County Council to explore funding for flood mitigation, attenuation and flood routing.

Brandon Road – Internal flooding experienced on 23 June 2016

Causes – Surface run-off that had made its way onto the highway flowed onto the accesses of affected properties that were situated lower than the road. Vehicles using the highway pushed water towards the affected properties.

Recommendations – Norfolk County Council to explore funding for flood mitigation, attenuation and flood routing.

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies

Flood Events and Flood Risk

Sharman Avenue – Internal flooding experienced on 23 June 2016

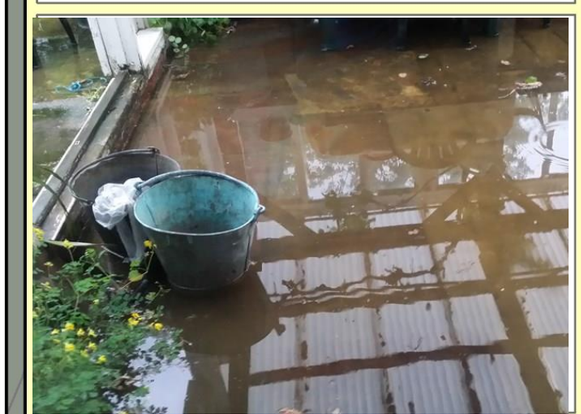
Causes – Run-off from significant rainfall that fell on the urban and green spaces within the catchment was concentrated along overland flowpaths on which the affected properties are positioned

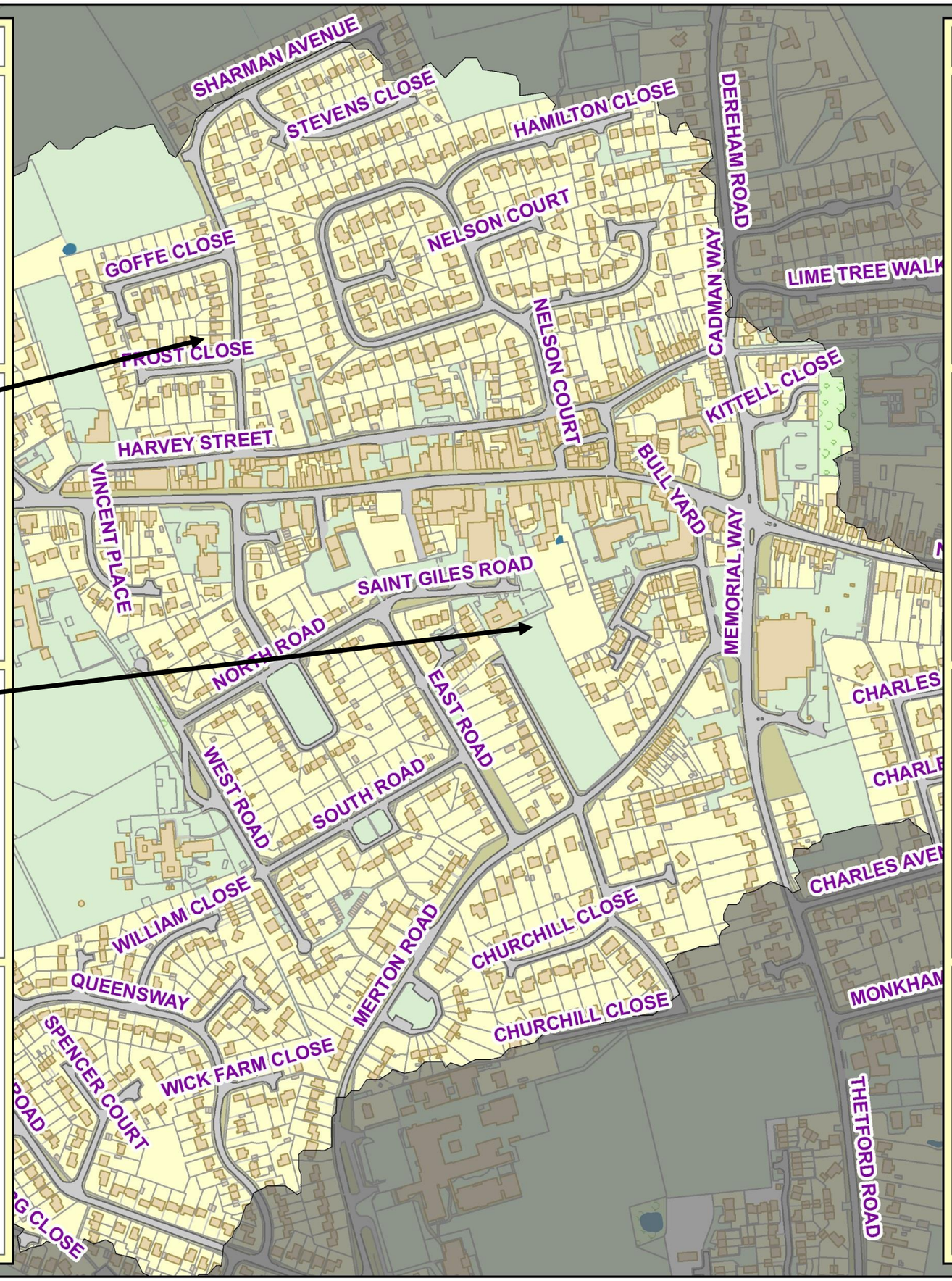
Recommendations – Norfolk County Council to explore funding for flood mitigation, attenuation and flood routing.

High Street – Internal flooding experienced on 23 June 2016

Causes – Run-off from significant rainfall that fell on the green spaces within the catchment was concentrated along overland flowpaths on which the affected properties are positioned

Recommendations – Norfolk County Council to explore funding for flood mitigation, attenuation and flood routing.



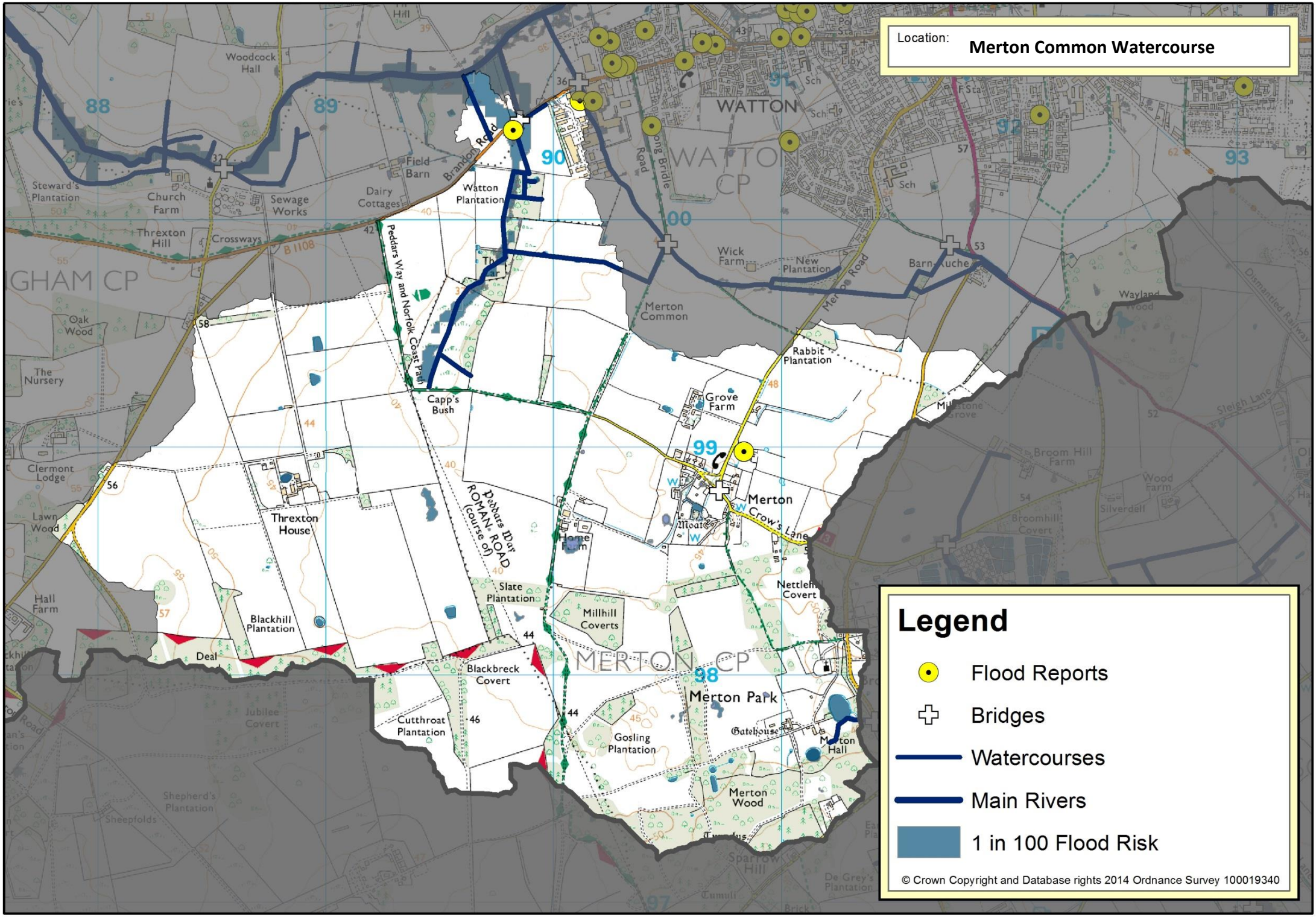


Location: **Watton Centre Catchment**

External flooding – 17 other reports of external or unconfirmed internal flooding were also received from Brandon Road, Tom Milford Place, St Giles Road, Swaffham Road, High Street, Tern Close, Heys Close, Jubilee Road.

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies


Location:
Merton Common Watercourse
Legend
Flood Reports
Bridges
Watercourses
Main Rivers
1 in 100 Flood Risk
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340
WATTON
WATTON CP
MERTON CP
Merton Common
Watton Plantation
Capp's Bush
Grove Farm
Rabbit Plantation
Merton
Crow's Lane
Threxton House
Blackhill Plantation
Slate Plantation
Millhill Coverts
Blackbreck Covert
Cutthroat Plantation
Gosling Plantation
Merton Park
Merton Hall
Merton Wood
Nettlehill Covert
Peddars Way and Norfolk Coast Path
Peddars Dyr ROMAN ROAD (course of)
Merton Road
Brandon Road
Long Bridle Road
Wick Farm
New Plantation
Barn Kuche
Threxton Hill
Crossways
Church Farm
Sewage Works
Dairy Cottages
Field Barn
Steward's Plantation
Woodcock Hall
Oak Wood
The Nursery
Clermont Lodge
Lawn Wood
Hall Farm
Deal
Jubilee Covert
Shepherd's Plantation
Sheepfolds
Home Farm
Moat
Broom Hill Farm
Broomhill Covert
Silverdell
Wood Farm
Wayland Wood
Sleigh Lane
Dismantled Railway
Sparrow Hill
De Grey's Plantation
Tumuli
Gatehouse
88
89
90
91
92
93
97
98
99
00

Flooding and flood risk within the Merton Common Watercourse Catchment

Description of catchment

This catchment is a large rural catchment that directs surface water South to North towards a minor watercourse that is a tributary of Watton Brook. The flood risk identified in this catchment is minor. The flooding in this catchment was widely dispersed.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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	5	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	0	0

Flood incidents within this catchment

Within this catchment 14 reports of external and internal flooding have been received. Out of these 14 reports 3 incidents of internal flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 1 property was internally flooded on **Watton Road**, Merton. This incident was reported by a Parish Councillor via email correspondence on the 20 July 2016, (FWF/16/3/3086)	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.
On the 23/06/2016 - 2 properties were internally flooded on **Brandon Road**, Saham Toney. These incidents were reported by: • Breckland District Council via email correspondence on the 18 July 2016, (FWF/16/3/3863) • Norfolk County Council (Highways) via an electronic report on the 24 June 2016, (FWF/16/3/3914)	• The Fire and Rescue Service visited affected residents to offer advice and to gather information during the incident. • 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

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;

23 June 2016 - 47mm rainfall was recorded as falling in 3 hours 0 minutes at the Watton rainfall monitoring station. This intensity of rainfall for the total duration equates to a 46 year rainfall event.

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
June 2009	One resident on Brandon Road stated that they had experienced flooding previously in 2009. They did not state what the impact of this incident was.	Not known

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
Watton Road, Merton, 23/06/2016 Brandon Road, Saham Toney, 23/06/2016	Run-off from significant rainfall that fell on the predominantly rural catchment was concentrated along overland flowpaths and ditches adjacent to where the affected properties are positioned. Surface water run-off also flowed along and across roads pooling at a low point near the affected properties.	Property owners, Land owners
Brandon Road, Saham Toney, 23/06/2016	Significant rainfall was directed into the surface water and foul drainage networks from higher up in the catchment. This caused the downstream network to surcharge. Flows that exceeded the system's capacity contributed to the flooding.	Anglian Water Highway Authority
Watton Road, Merton, 23/06/2016 Brandon Road, Saham Toney, 23/06/2016	The flood water entered the properties through the unprotected structure of the building. This included via features such as low thresholds at entrances, unprotected air bricks and services conduits.	Property owners

Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
Watton Road, Merton, 23/06/2016 Brandon Road, Saham Toney, 23/06/2016	Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council will 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.	Norfolk County Council, Property owners	12 months
Watton Road, Merton, 23/06/2016 Brandon Road, Saham Toney, 23/06/2016	Norfolk County Council would seek to remind riparian owners of their responsibility to undertake appropriate levels of maintenance to sustain the efficiency of the drainage systems.	Norfolk County Council, Riparian owners	12 months

Flood Events and Flood Risk

Brandon Road – Internal flooding experienced on 23 June 2016

Causes – Run-off from significant rainfall that fell on the green spaces within the catchment was concentrated along overland flowpaths and ditches on which the affected properties are positioned

Recommendations – Property owners should Norfolk County Council to explore funding for flood mitigation, attenuation and flood routing.

External flooding – 11 other reports of external or unconfirmed internal flooding were also received from Crows Lane, Home Farm Lane, The Green and Watton Road.

Legend

- Bridges
- Watercourses
- Main Rivers
- Water bodies

BRANDON ROAD

THREXTON ROAD

BRIDLE ROAD

THE GREEN

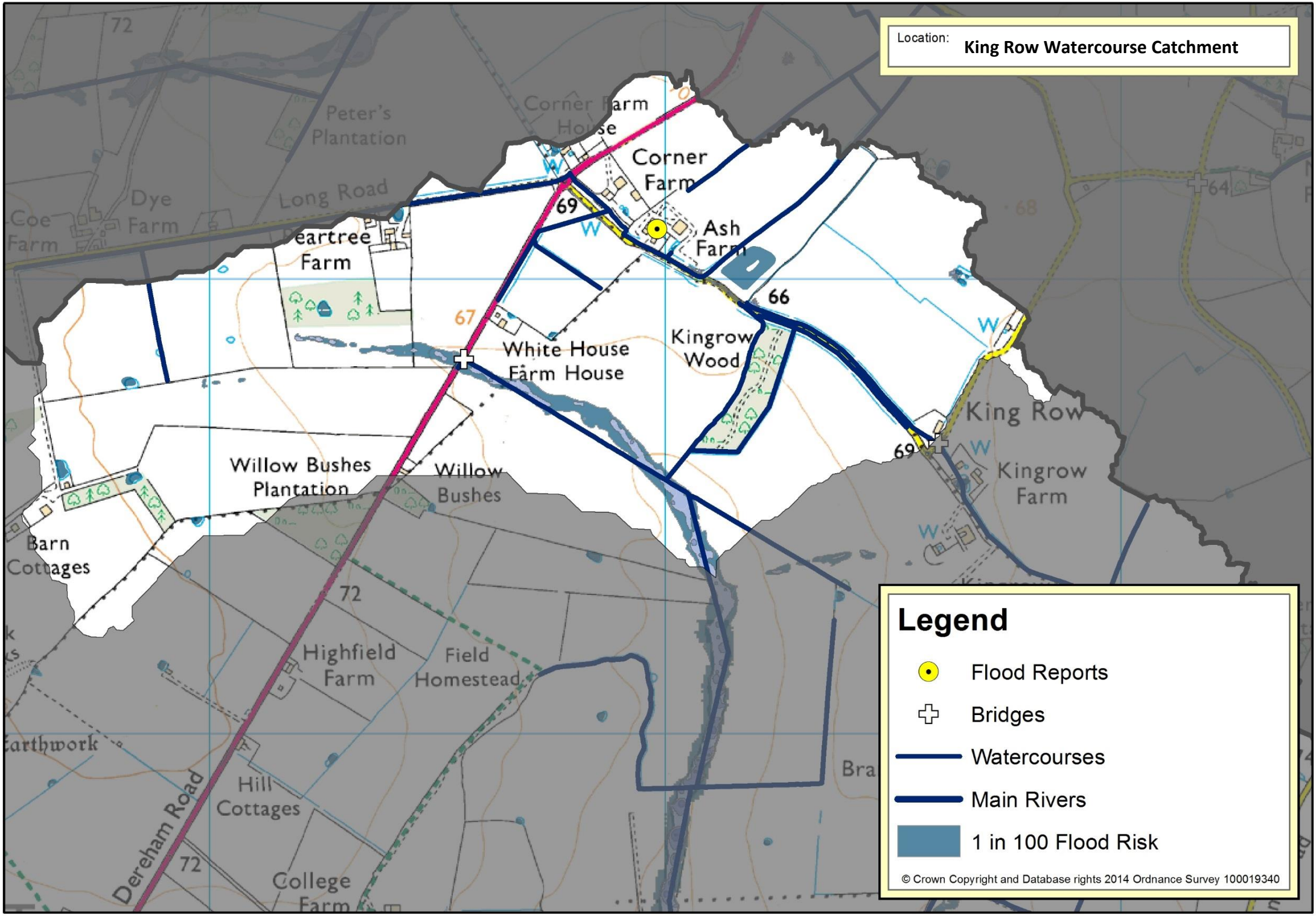
WATTON ROAD

Location: **Merton Common Watercourse**

Watton Road – Internal flooding experienced on 23 June 2016

Causes – Run-off from significant rainfall that fell on the green spaces within the catchment was concentrated along overland flowpaths and ditches on which the affected properties are positioned

Recommendations – Norfolk County Council to advise residents regarding property level protection.


Location:
King Row Watercourse Catchment
Peter's Plantation
Corner Farm House
Corner Farm
Long Road
Dye Farm
Coe Farm
eartree Farm
Ash Farm
69
67
66
64
68
White House Farm House
Kingrow Wood
King Row
Kingrow Farm
Willow Bushes Plantation
Willow Bushes
Barn Cottages
72
Highfield Farm
Field Homestead
Earthwork
Hill Cottages
Dereham Road
College Farm
Legend
Flood Reports
Bridges
Watercourses
Main Rivers
1 in 100 Flood Risk
© Crown Copyright and Database rights 2014 Ordnance Survey 100019340

Flooding and flood risk within the King Row Watercourse Catchment

Description of catchment

This catchment is formed of two minor watercourses that flow from the North to converge to the South of Kingrow Wood. There is no significant flood risk identified in this catchment and all the incidents of flooding are located along King Row.

Flood Risk within the catchment

The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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	0	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 reports of external and internal flooding have been received. Out of these 3 reports 1 incident of internal flooding and 1 incident of Highways flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 1 property was internally flooded on **King Row**, Shipdam. This incident was reported by the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/3/3302)	• The Fire and Rescue Service visited affected residents to offer advice and to gather information during the incident. • Norfolk County Council (LLFA) visited affected residents to offer advice and to gather information after the incident.
On the 23/06/2016 1 vehicle became stuck in flood water on **King Row**. This incident was reported by: Norfolk County Council (Highways) via an electronic report on the 24 June 2016 (FWF/16/3/3909)	• A member of the public provided emergency assistance to the motorist and helped him to safety. • Norfolk County Council (Highways) visited affected residents to offer advice and to gather information after the incident.

Recent rainfall within the catchment

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;

Historic flooding incidents within the catchment

No information on historic flooding incidents within the catchment has been forthcoming during the course of this investigation.

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
King Row, Shipdam, 23/06/2016	Run-off from significant rainfall that fell on this rural catchment was concentrated along overland flowpaths and watercourses adjacent to where the affected property is positioned. Surface water run-off also flowed along and across roads pooling at a low point where the watercourse crosses the road where the vehicle became stuck.	Property owners, Land owners

Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
King Row, Shipdam, 23/06/2016	Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council will 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.	Norfolk County Council, Property owners	12 months
King Row, Shipdam, 23/06/2016	Norfolk County Council would seek to remind riparian owners of their responsibility to undertake appropriate levels of maintenance to sustain the efficiency of the drainage systems.	Norfolk County Council, Riparian owners	12 months

Location: **King Row Watercourse Catchment**

Flood Events and Flood Risk

WATTON ROAD

LONG ROAD

WOOD LANE

DEREHAM ROAD

KING R

King Row – Stranded motorist on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse and connected drainage.

Recommendations – Norfolk County Council to remind riparian owners to maintain watercourse.

External flooding – 1 other report of unconfirmed internal flooding was also received from Watton Road.

King Row – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse and connected drainage.

Recommendations – Property owners should seek to protect their buildings through flood protection measures. Norfolk County Council to provide advice to local residents.

Legend

- Bridges
- Water bodies
- Watercourses
- Main Rivers

Flooding and flood risk across the wider Watton Brook catchments

Description of catchment
This section of report records flood incidents that are not associated with significant concentrations of flooding or flood risk.

Flood Risk within the catchment
The flood risk from local sources (ordinary watercourses and surface run-off) and strategic sources (main rivers) 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 incidents within this catchment

Within this catchment 11 reports of external and internal flooding have been received. Out of these 11 reports 2 incidents of internal flooding have been confirmed and assessed as part of this investigation. These incidents are detailed in the table below.

Incident as reported	What was the response to the flood incident
On the 23/06/2016 - 1 property was internally flooded on **Ovington Road**, Saham Toney. This incident was reported by a resident via an online flood report form on the 8 August 2016, (FWF/16/3/3131)	• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident. • Norfolk County Council (Highways) carried out measures to minimise the impact of flooding after the incident.
On the 23/06/2016 - 1 property was internally flooded on **Bell Lane**, Saham Toney. This incident was reported by the Fire and Rescue Service via an electronic report on the 10 July 2016, (FWF/16/3/3275)	• The Fire and Rescue Service visited affected residents to offer advice and to gather information during the incident.

Recent rainfall within the catchment

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	One resident report that Ovington Road had flooded previously but did not state when or what the impact was.	Unknown

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.

Flooding experienced at / on	Causes of flooding	Who has responsibilities to manage the cause(s) of the flood?
Ovington Road, Saham Toney, 23/06/2016 Bell Lane, Saham Toney, 23/06/2016	Run-off from significant rainfall across the catchment was directed along flow paths towards the surface water drainage network and the watercourse. These flows could not be accommodated by the receiving watercourse which led to the overloading of connecting drainage. Flows that could not be accommodated by the watercourse and drainage system found their way onto other features such as roads, gardens and into the affected properties. The evidence provided by residents when compared against risk mapping suggests the rainfall event experienced on the 23 June 2016 would be classed as significant and beyond the capacity of existing drainage provision.	Property owners, Land owners, Riparian owners, Anglian Water, Norfolk County Council
Ovington Road, Saham Toney, 23/06/2016 Bell Lane, Saham Toney, 23/06/2016	The flood water entered many of the properties through the unprotected structure of the building. This included via features such as low thresholds at entrances, unprotected air bricks and services conduits.	Property owners

Flooding experienced at / on	Recommendation	Who has responsibility to follow up the recommendation?	Timescale
Ovington Road, Saham Toney, 23/06/2016 Bell Lane, Saham Toney, 23/06/2016	Norfolk County Council will 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.	Norfolk County Council, Property owners	12 months
Ovington Road, Saham Toney, 23/06/2016 Bell Lane, Saham Toney, 23/06/2016	Norfolk County Council would seek to remind riparian owners of their responsibility to undertake appropriate levels of maintenance to sustain the efficiency of the drainage systems.	Norfolk County Council, Riparian owners	12 months

Flood Events and Flood Risk

Bell Lane – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse and connected drainage.

Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities

External flooding – 9 other reports of external or unconfirmed internal flooding were also received from The Street (x3) and Saham Road (x2), Ovington; Ovington Road (x1), Richmond Road (1x), Saham Toney; Watton Green (x1), Norwich Road (x1), Watton.

Location:

Other flood incidents

Ovington Road – Internal flooding experienced on 23 June 2016

Causes – Significant rainfall caused run-off to exceed the capacity of the receiving watercourse and connected drainage.

Recommendations – Norfolk County Council to explore funding for flood mitigation and to determine flood routing opportunities

PLOUGHBOY LANE

CHEQUERS LANE

MILL VIEW

MILL VIEW

OVINGTON ROAD

BELL LANE

CLEY LANE

Legend

- Bridges
- Water bodies
- Watercourses
- Main Rivers

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.
- For more information see our webpage: https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/information-for-homeowners/living-next-to-a-watercourse

Norfolk County Council

Community and Environmental Services
County Hall
Martineau Lane
Norwich
NR1 2SG

NCC contact number: 0344 800 8020
Text relay no: 18001 0344 800 8020
Email:
water.management@norfolk.gov.uk

Date: 19 March 2018

Dear Sir/Madam

Thank you for your response to the Draft Flood Investigation Report for Watton. We have collated the replies and made amendments to the final report where necessary. Below are a few general comments which refer to those issues which appeared most frequently in the feedback from the report.

- Some people pointed out properties that were flooded but not mentioned in the report. To clarify, properties will only be included in the formal flood investigation where *internal* flooding has occurred and secondary evidence to support this has been submitted to us. Where incomplete or insufficient evidence was supplied, these properties were omitted from the final report.
- There was general uncertainty regarding the responsibilities of Riparian Owners for ordinary watercourses running through, or adjacent to, their property. A reminder of these responsibilities can be found on our website at https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/information-for-homeowners/living-next-to-a-watercourse. This link will also be included in Appendix A of the final report.
- Concern regarding the new property developments in the Saham area was a common feature of the responses. Property in all new developments should be flood protected by higher standards i.e. including a SuDS solution and also should not increase any downstream flood risk. Norfolk County Council is consulted on planning applications for major developments and responds where it meets our thresholds. The Local Planning Authority is a determining body for planning applications. The Saham Toney Neighbourhood Plan outlines the consultation process for areas of high or medium flood risk and can be found here under Policy 8.1: https://www.stnp2036.org/the-policies.html
- For clarification: the timescale of 12 months in the recommendations section refers to 12 months following the publishing of this report.

Kind regards

On behalf of Mark Ogden

Flood and Water Management Team
Lead Local Flood Authority