



# Norfolk County Council

Investigation Report into the flooding in North Norfolk District in Winter 2020-2021

Report Reference: FIR066

Draft Report prepared by Nathalie Harris, Sean Riseley, Mark Henderson and Steve Halls



|   |    |
|---|----|
| Executive Summary                                 | 3  |
| Introduction                                      | 3  |
| Justification for Flood Investigation             | 4  |
| Flooding and flood risk in Potter Heigham         | 6  |
| Flooding and flood risk in Hickling               | 10 |
| Flooding and flood risk in Stalham                | 15 |
| Flooding and flood risk in Itteringham            | 20 |
| Flooding and flood risk in Roughton               | 24 |
| Flooding and flood risk in Tunstead               | 28 |
| Appendix A - Key definitions and responsibilities | 33 |

## Executive Summary

### Introduction

Flooding occurred across North Norfolk in December 2020 and January 2021. Norfolk County Council has confirmed 8 incidences of internal flooding on this date which are covered in this report. However, it is suspected that the event is highly under-reported. This assumption is based on information from the public who informed us that their neighbours and local area had been flooded. Norfolk County Council has tried to contact these residents but has not received a response. Any subsequent reports received for this date will be investigated and published in an additional report.

Norfolk received an above normal amount of rainfall throughout December with a total of 1117.7mm rainfall, 204% of the Long-Term Average. On the 23 December rainfall was particularly concentrated within the worst affected where there were significant clusters of properties flooded with more isolated properties internally flooded in other parts of the district.

#### (a) Flooding incidents and causes

The flooding that occurred in the locations listed below led to the internal flooding of 8 properties.

| <b>Location</b>                | <b>Number of affected properties</b> |
|--------------------------------|--------------------------------------|
| <a href="#">Potter Heigham</a> | 1                                    |
| <a href="#">Hickling</a>       | 2                                    |
| <a href="#">Stalham</a>        | 2                                    |
| <a href="#">Itteringham</a>    | 1                                    |
| <a href="#">Roughton</a>       | 1                                    |
| <a href="#">Tunstead</a>       | 1                                    |

## Justification for Flood Investigation

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

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

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

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

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

In this instance it was deemed necessary to complete a formal investigation as:  
[list reasons to justify investigation]

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.

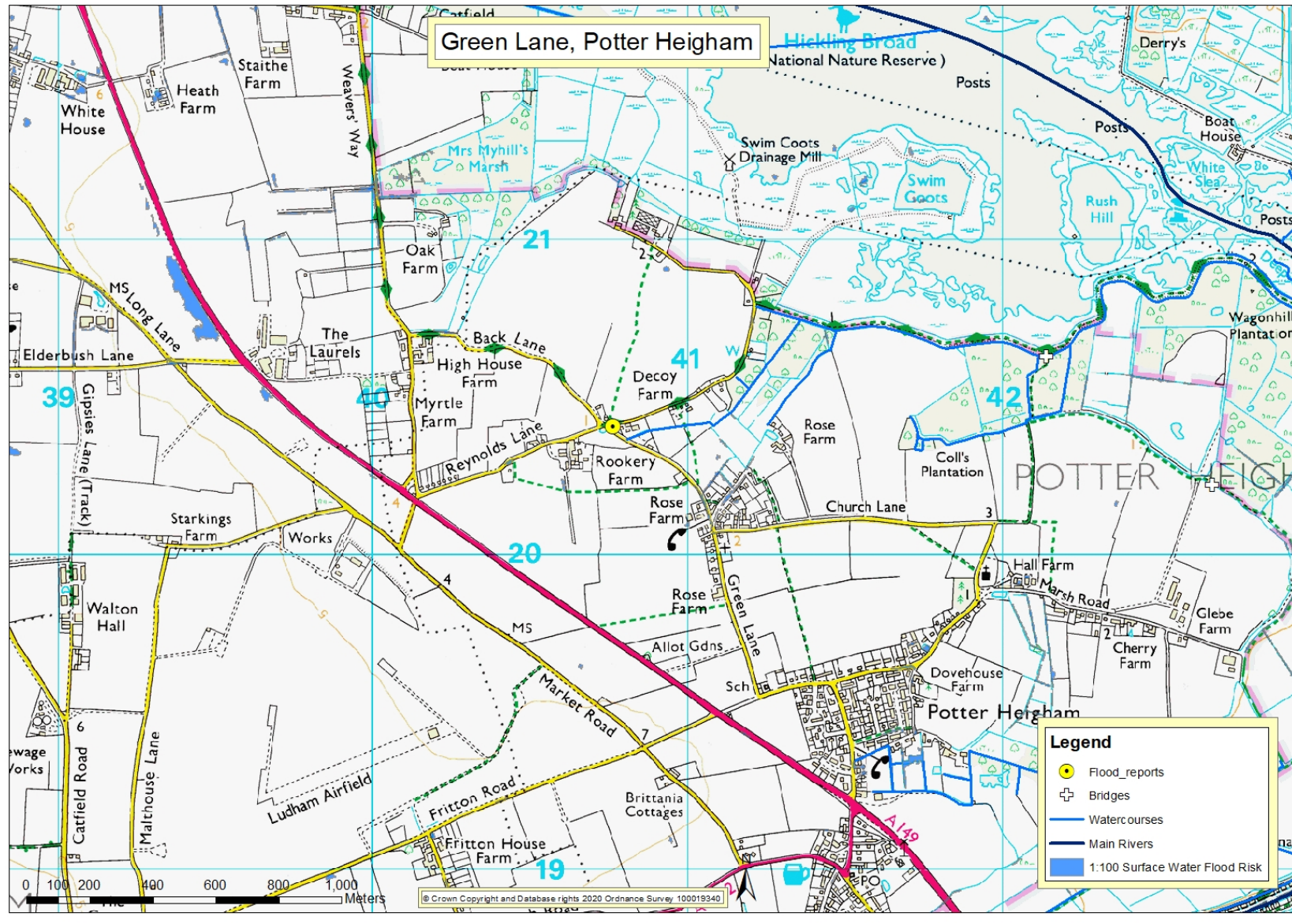


Mitigation measures include property level protection: reinstating lost drainage features: reviewing or increasing maintenance regimes and increasing the capacity of the drainage network.

The flood investigation report cannot:

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

# Flooding and flood risk in Potter Heigham



## Flood incidents within this area

Within Potter Heigham 1 incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

| Date of Incident | Incident as reported  | What was the response to the flood incident   |
|------------------|---|---|
| 18/01/2021       | On the 18/01/2021 - 1 property was internally flooded on Green Lane, Potter Heigham. This incident was reported by <ul style="list-style-type: none"><li>a resident via an online flood report form on the 21/02/2021, (4232)</li></ul> | <ul style="list-style-type: none"><li>Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.</li><li>Anglian Water Services Ltd carried out measures to minimise the impact of flooding after the incident.</li></ul> |

## Recent rainfall within the catchment

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

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

## Historic flooding incidents within the catchment

The Lead Local Flood Authority has no previous reports of internal flooding on Green Lane, Potter Heigham.

## Causes of flooding within the catchment and recommendations

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

Following flooding to people, property and infrastructure

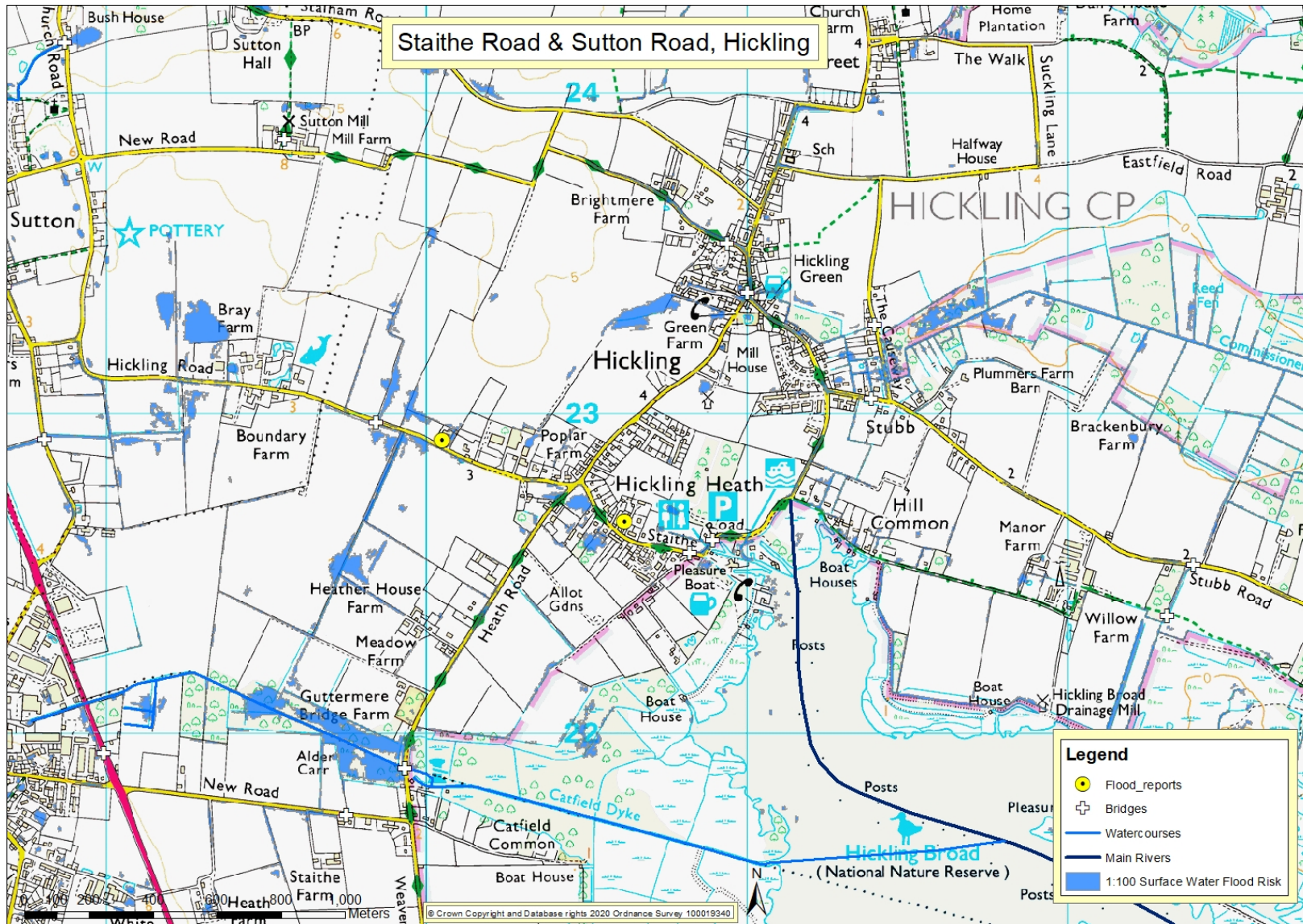
- Risk Management Authorities should
  - communicate with affected residents where their assets have given rise to the flooding of properties.

- review the appropriateness of their response to flooding.
- determine the integrity and/or capacity of their assets where they have contributed to the flooding of properties to understand the systems role in accommodating normal rainfall events as well as mitigating flooding.
  
- Property owners of affected properties should seek their own legal advice.
  
- NCC should
  - incorporate all relevant information of actual flooding into the review of the Norfolk Preliminary Flood Risk Assessment (“PFRA”).
  - review and monitor the delivery of recommendations within this and other relevant flood investigation reports.

| Location and date of flooding                 | Causes of flooding  | Recommendation  | Who has responsibilities to manage the cause(s) of the flood?   |
|---|---|---|---|
| <p>Green Lane, Potter Heigham, 18/01/2021</p> | <ul style="list-style-type: none"> <li>Run-off from rainfall was directed towards the foul drainage network. These flows could not be accommodated as the system was already overloaded. This overwhelmed the system causing it to surcharge inside the affected property. This was due to additional property connections e.g. connected house extensions to existing networks.</li> </ul> | <ul style="list-style-type: none"> <li>Anglian Water should work with partner organisations to identify the potential for managing the amount or rate of surface water entering their drainage system in flood events.</li> <li>Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application. Property owners could also carry out their own measures where funding is not forthcoming or residents are unwilling to wait.</li> </ul> | <ul style="list-style-type: none"> <li>Anglian Water</li> </ul> |



# Flooding and flood risk in Hickling



## Flood incidents in Hickling

Within this area 2 incidents of internal flooding have been assessed as part of this investigation. These incidents are detailed in the table below.

| <b>Date of Incident</b> | <b>Incident as reported</b>   | <b>What was the response to the flood incident</b>  |
|-------------------------|---|---|
| 24/12/2020              | On the 24/12/2020 - 1 property was internally flooded on Sutton Road, Hickling. This incident was reported by <ul style="list-style-type: none"><li>a resident via an online flood report form on the 19/02/2021, (4187)</li></ul>  | <ul style="list-style-type: none"><li>Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.</li></ul>                              |
| 23/12/2020              | On the 23/12/2020 - 1 property was internally flooded on Staithe Road, Hickling. This incident was reported by <ul style="list-style-type: none"><li>a resident via an online flood report form on the 23/03/2021, (4157)</li></ul> | <ul style="list-style-type: none"><li>A resident carried out measures to minimise the impact of flooding during the incident.</li><li>The Fire and Rescue Service responded and pumped out during the incident.</li></ul> |

## Recent rainfall within the catchment

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

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

Staithe Road is within 2.5km of a rain gauge

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

## Historic flooding incidents within the catchment

The Lead Local Flood Authority has no previous reports of internal flooding on Sutton Road or Staithe Road, Hickling.

## Causes of flooding within the catchment and recommendations

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

## Following flooding to people, property and infrastructure

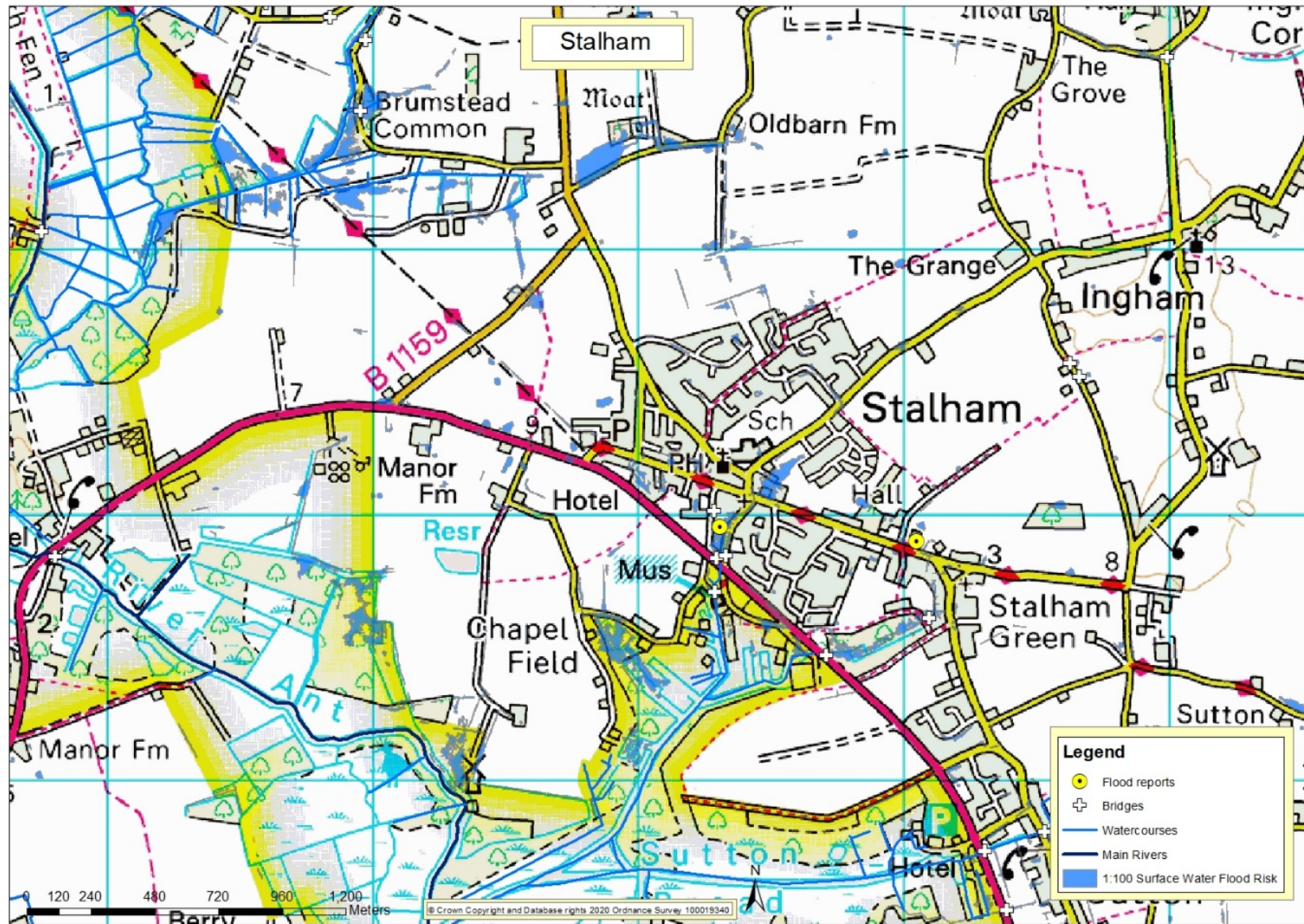
- Risk Management Authorities should
  - communicate with affected residents where their assets have given rise to the flooding of properties.
  - review the appropriateness of their response to flooding.
  - determine the integrity and/or capacity of their assets where they have contributed to the flooding of properties to understand the systems role in accommodating normal rainfall events as well as mitigating flooding.
- Property owners of affected properties should seek their own legal advice.
- NCC should
  - incorporate all relevant information of actual flooding into the review of the Norfolk Preliminary Flood Risk Assessment (“PFRA”).
  - review and monitor the delivery of recommendations within this and other relevant flood investigation reports.



| Location and date of flooding            | Causes of flooding   | Recommendation  | Who has responsibilities to manage the cause(s) of the flood?  |
|--|--|---|--|
| <p>Sutton Road, Hickling, 24/12/2020</p> | <p>Run-off from significant rainfall was directed towards individual property drainage. These flows could not be accommodated as the system is of insufficient capacity and was fully obstructed by debris and silt. This caused the failure of the upstream drainage system contributing to flooding at the affected properties.</p> <p>The loss of a pre-existing drainage feature (culvert) within the catchment exacerbated the flooding.</p> <p>Surface run-off from rainfall flowed off adjacent fields and onto the accesses of affected properties that were situated lower than these features.</p> | <ul style="list-style-type: none"> <li>• The property owner should determine the adequacy of the on-site drainage and where appropriate increase on-site storage capacity and system efficiency.</li> <li>• The property owner should work with Norfolk County Council to see if the historical culvert is still there and able to be recovered.</li> </ul> | <ul style="list-style-type: none"> <li>• Property owner(s)</li> <li>• Norfolk County Council (LLFA)</li> </ul> |

|   |   |   |   |
|---|---|---|---|
| <p>Staithe Road,<br/>Hickling,<br/>23/12/2020</p> | <p>Run-off from significant rainfall was directed towards the surface water drainage network and the foul water drainage network. These flows could not be accommodated as the system was already overloaded. This caused the system to surcharge and flood water was directed towards the affected property.</p> | <ul style="list-style-type: none"> <li>• Norfolk County Council and Anglian Water should work with partner organisations to identify the potential for managing the amount or rate of surface water entering their drainage system in flood events.</li> <li>• The adjacent landowner(s) could: <ul style="list-style-type: none"> <li>➤ implement new land management techniques to reduce the surface water run off.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Norfolk County Council</li> <li>• Adjacent landowner(s)</li> </ul> |
|---|---|---|---|

# Flooding and flood risk in Stalham



## Flood incidents in Stalham

Within this area 2 incidents of internal flooding have been assessed as part of this investigation. These incidents are detailed in the table below.

| Date of Incident | Incident as reported  | What was the response to the flood incident      |
|------------------|---|--|
| 24/12/2020       | On the 24/12/2020 - 1 property was internally flooded on Yarmouth Road, Stalham. This incident was reported by <ul style="list-style-type: none"><li>a resident via an online flood report form on the 17/01/2021, (3723)</li></ul>     | <ul style="list-style-type: none"><li></li></ul> |
| 23/12/2020       | On the 23/12/2020 - 1 property was internally flooded on Upper Staithe Road, Stalham. This incident was reported by <ul style="list-style-type: none"><li>a resident via an online flood report form on the 4/01/2021, (3602)</li></ul> | <ul style="list-style-type: none"><li></li></ul> |

## Recent rainfall within the catchment

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

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

## Historic flooding incidents within the catchment

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

| Date of incident | Impact   | Rainfall intensity |
|------------------|--|--------------------|
| 2015-2021        | Norfolk County Council has several reports of flooding on Staithe Road, Stalham. Please see the following link to previous investigation reports:<br><a href="https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/flood-investigations">https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/flood-investigations</a> |                    |

## Causes of flooding within the catchment and recommendations

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

Following flooding to people, property and infrastructure

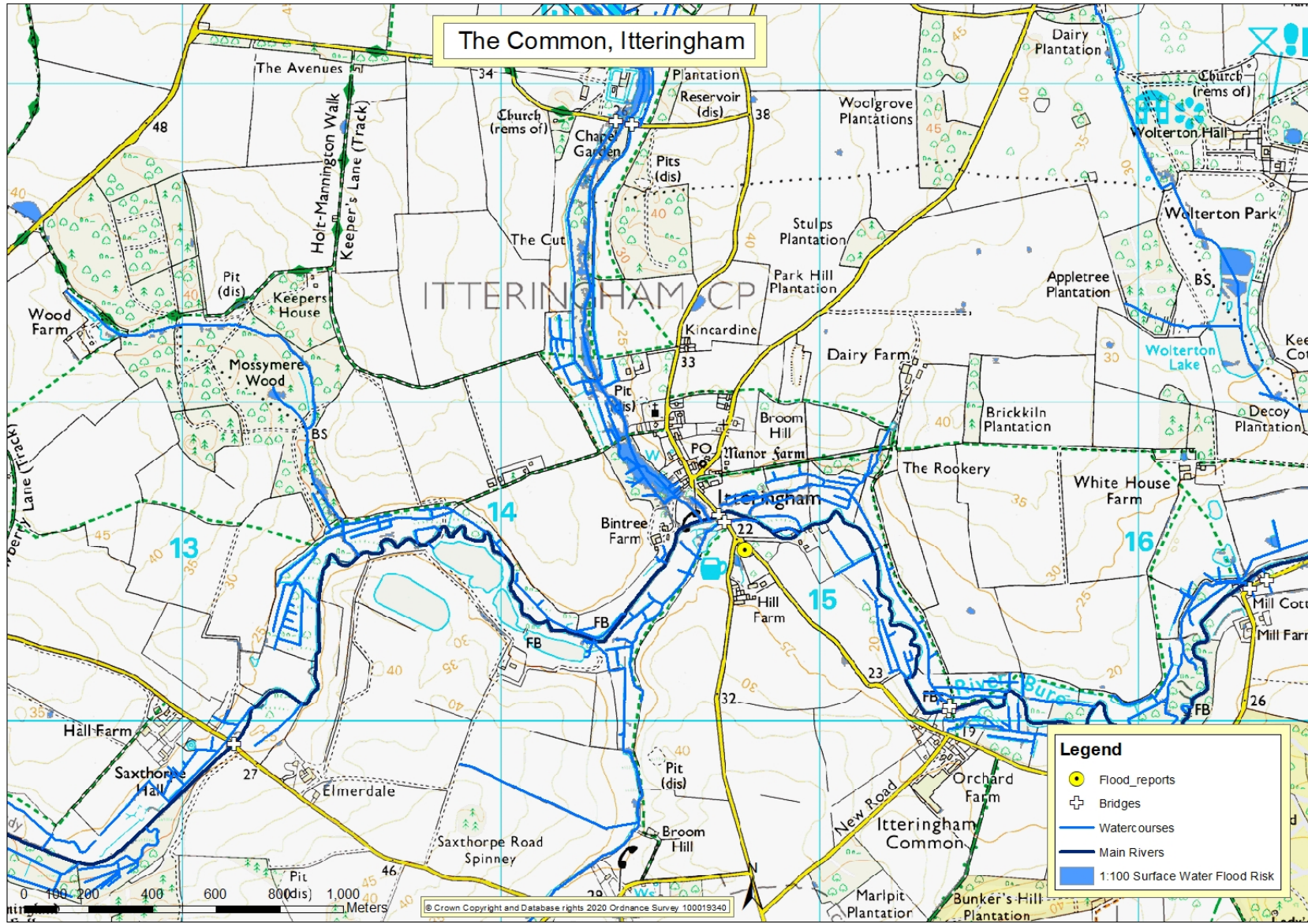
- Risk Management Authorities should
  - communicate with affected residents where their assets have given rise to the flooding of properties.
  - review the appropriateness of their response to flooding.
  - determine the integrity and/or capacity of their assets where they have contributed to the flooding of properties to understand the systems role in accommodating normal rainfall events as well as mitigating flooding.
- Property owners of affected properties should seek their own legal advice.
- NCC should
  - incorporate all relevant information of actual flooding into the review of the Norfolk Preliminary Flood Risk Assessment (“PFRA”).
  - review and monitor the delivery of recommendations within this and other relevant flood investigation reports.

| Location and date of flooding                     | Causes of flooding  | Recommendation   | Who has responsibilities to manage the cause(s) of the flood? |
|---|---|--|---|
| <p>Yarmouth Road,<br/>Stalham,<br/>24/12/2020</p> | <p>The ditches surrounding the property were backed up by a private culvert adjacent to the property effected and then subsequently by piped crossing under Yarmouth Rd (Highways Asset)</p> <p>Flood water entered the properties through low thresholds at entrances / the air bricks / the electricity conduits.</p> | <ul style="list-style-type: none"> <li>• Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.</li> <li>• Riparian owners to clear watercourses (open and/or piped) through areas of concern particularly downstream of effected property. Ensures sufficient capacity and reduction of blockage potential likely to cause reduced conveyance and breaches.</li> <li>• NCC Highways to jet and CCTV culvert underneath Yarmouth Rd.</li> </ul> |   |

|   |   |  |  |
|---|---|--|--|
| <p>Staithe<br/>Road,<br/>Stalham<br/>23/12/2020</p> | <p>The ditch behind the property was blocked reducing its capacity.</p> <p>Properties draining their surface water into the ditch are contributing to flooding at the location.</p> <p>The property has low thresholds.</p> <p>Run-off from rainfall pooled at a low point within the catchment affecting property.</p> | <ul style="list-style-type: none"> <li>• Property owners should protect their buildings through flood protection measures where appropriate. Norfolk County Council will communicate with local residents to advise them how they may apply for grants available. These grants are subject to a funding application.</li> <li>• A regular regime of maintenance should be instated to keep the ditch clear of vegetation.</li> </ul> | <ul style="list-style-type: none"> <li>• Property owner(s)</li> <li>• Norfolk County Council (LLFA)</li> </ul> |
|---|---|--|--|



# Flooding and flood risk in Itteringham





### Flood incidents within this area

Within this area 1 incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

| Date of Incident | Incident as reported   | What was the response to the flood incident  |
|------------------|--|--|
|                  | <p>On the 24/12/2020 - 1 property was internally flooded on The Common, Itteringham. This incident was reported by</p> <ul style="list-style-type: none"><li>• a resident via an online flood report form on the 5/01/2021, (3278)</li></ul> | <ul style="list-style-type: none"><li>• Norfolk County Council (Highways) carried out maintenance work to the highway drainage system after the incident.</li><li>• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.</li><li>• A resident carried out measures to minimise the impact of flooding during the incident.</li></ul> |

### Recent rainfall within the catchment

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

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

### Historic flooding incidents within the area

The Lead Local Flood Authority has no previous reports of internal flooding in Itteringham.

### Causes of flooding within the catchment and recommendations

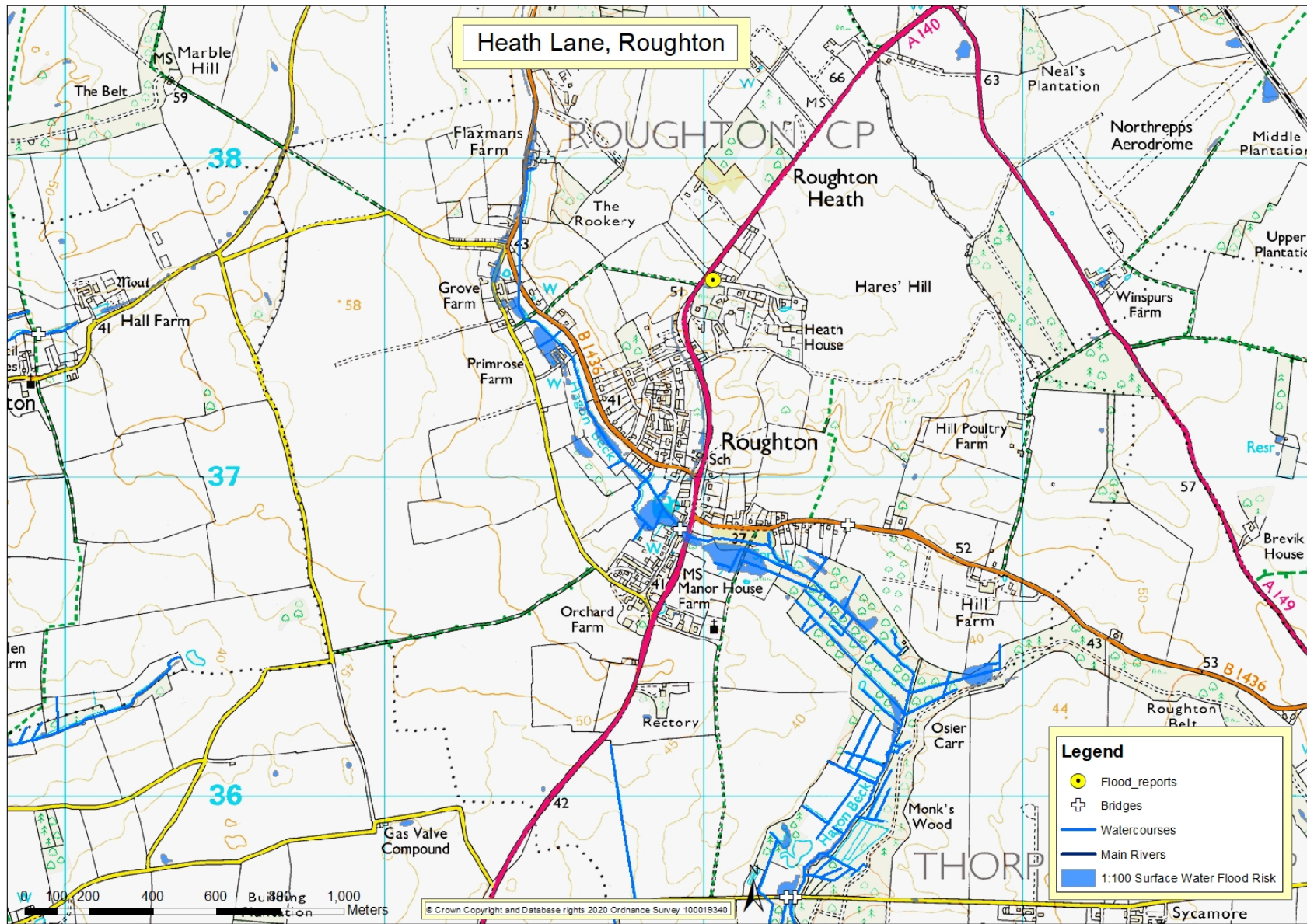
The findings of the investigation are detailed on the following pages. The first table details the causes that led to flooding within the catchment as well as when and where they were experienced. It also sets out which Risk Management Authorities have responsibility to help manage the causes of the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

Following flooding to people, property and infrastructure

- Risk Management Authorities should
  - communicate with affected residents where their assets have given rise to the flooding of properties.
  - review the appropriateness of their response to flooding.
  - determine the integrity and/or capacity of their assets where they have contributed to the flooding of properties to understand the systems role in accommodating normal rainfall events as well as mitigating flooding.
- Property owners of affected properties should seek their own legal advice.
- NCC should
  - incorporate all relevant information of actual flooding into the review of the Norfolk Preliminary Flood Risk Assessment (“PFRA”).
  - review and monitor the delivery of recommendations within this and other relevant flood investigation reports.

| Location and date of flooding              | Causes of flooding  | Recommendation   | Who has responsibilities to manage the cause(s) of the flood?   |
|--|---|--|---|
| <p>The Common, Itteringham, 24/12/2020</p> | <ul style="list-style-type: none"> <li>• Surface run-off from rainfall flowed off adjacent fields and made its way onto the highway. The surface water drainage system was fully obstructed by silt and so the water overflowed onto the private access of affected properties that were situated lower than these features.</li> </ul> | <ul style="list-style-type: none"> <li>• Norfolk County Council will review the capacity &amp; level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified. NCC should assess whether the capacity of the current system is able to provide protection that aligns with British standards. This may require a survey of the system being undertaken.</li> <li>• Norfolk County Council will investigate with third parties the potential for amending local land management.</li> </ul> | <ul style="list-style-type: none"> <li>• Norfolk County Council Highways</li> <li>• Local landowners</li> </ul> |

# Flooding and flood risk in Roughton



## Flood incidents within this area

Within this area 1 incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

| Date of Incident | Incident as reported  | What was the response to the flood incident  |
|------------------|---|--|
| 23/12/2020       | On the 23/12/2020 - 1 property was internally flooded on Heath Lane, Roughton. This incident was reported by <ul style="list-style-type: none"><li>a resident via an online flood report form on the 23/01/2021, (3241)</li></ul> | <ul style="list-style-type: none"><li>Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.</li><li>North Norfolk District Council visited to investigate a pollution issue linked to the flooding incident after the incident.</li><li>The landowner carried out measures to minimise the impact of flooding after the incident.</li><li>A resident carried out measures to minimise the impact of flooding during the incident.</li></ul> |

## Update

The tenant farmer has amended their land management to reduce the risk of field run off and flooding. They have agreed to maintain this land management for the length of the time that they are farming the field to ensure flood risk is minimised.

## Recent rainfall within the catchment

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

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

## Historic flooding incidents within the catchment

The Lead Local Flood Authority has no previous reports of internal flooding in Roughton.

## Causes of flooding within the catchment and recommendations

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

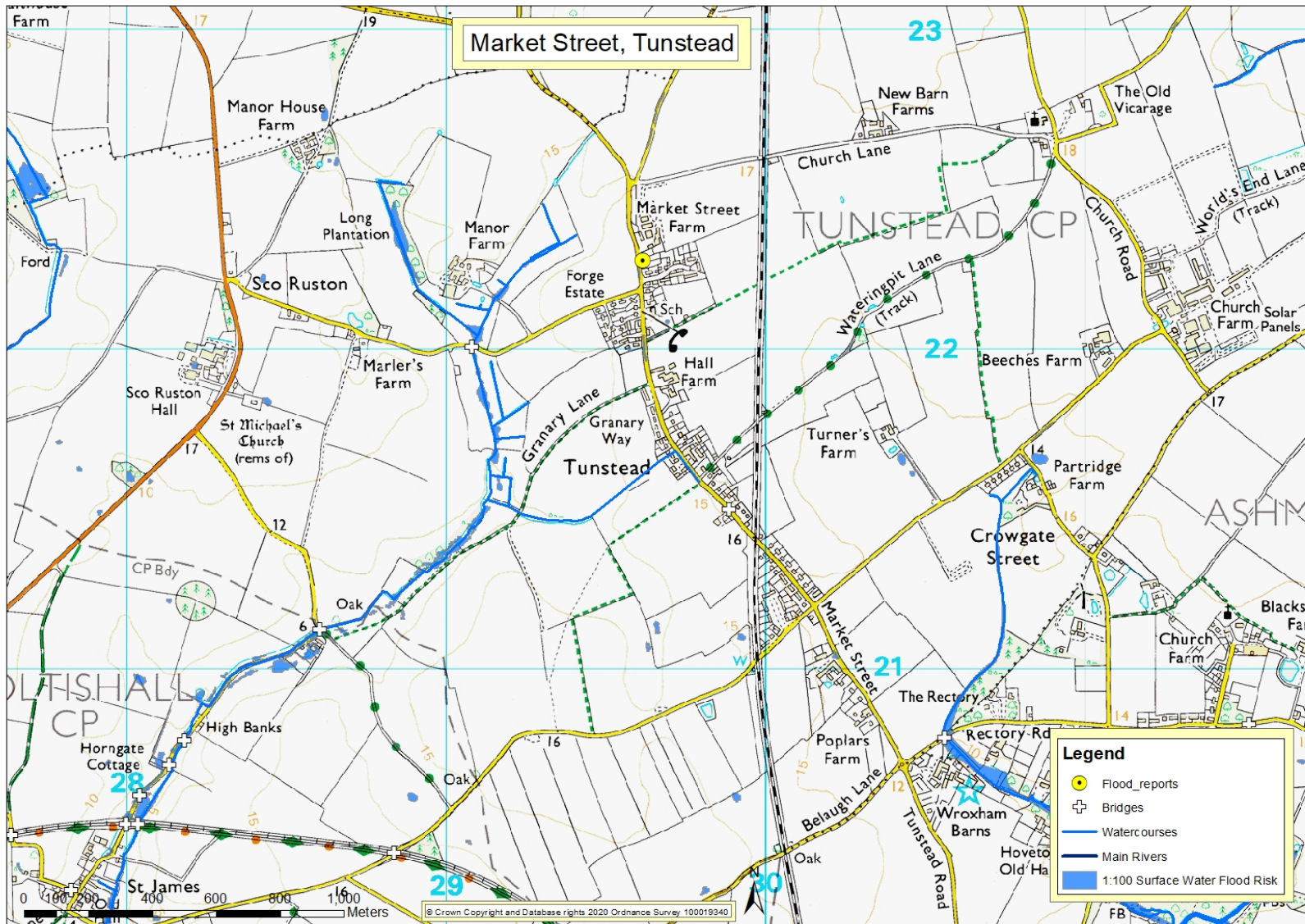
Following flooding to people, property and infrastructure

- Risk Management Authorities should
  - communicate with affected residents where their assets have given rise to the flooding of properties.
  - review the appropriateness of their response to flooding.
  - determine the integrity and/or capacity of their assets where they have contributed to the flooding of properties to understand the systems role in accommodating normal rainfall events as well as mitigating flooding.
- Property owners of affected properties should seek their own legal advice.
- NCC should
  - incorporate all relevant information of actual flooding into the review of the Norfolk Preliminary Flood Risk Assessment (“PFRA”).
  - review and monitor the delivery of recommendations within this and other relevant flood investigation reports.

| Location and date of flooding               | Causes of flooding   | Recommendation   | Who has responsibilities to manage the cause(s) of the flood?   |
|---|--|--|---|
| <p>Heath Lane,<br/>Roughton, 23/12/2020</p> | <p>Run-off from significant rainfall was concentrated along overland flowpaths on which the affected property is adjacent. The water flowed off adjacent fields and onto the accesses of affected properties that were situated lower than these features.</p> <p>Due to local land management run-off was directed quickly from where it fell as rain to the areas of flooding.</p> | <ul style="list-style-type: none"> <li>Norfolk County Council will investigate with third parties the potential for amending local land management.</li> </ul> | <ul style="list-style-type: none"> <li>Local Landowners</li> <li>Norfolk County Council (LLFA)</li> </ul> |



# Flooding and flood risk in Tunstead





## Flood incidents in Tunstead

Within Tunstead 1 incident of internal flooding has been assessed as part of this investigation. This incident is detailed in the table below.

| <b>Date of Incident</b> | <b>Incident as reported</b>   | <b>What was the response to the flood incident</b>   |
|-------------------------|---|--|
| 26/12/2020              | <p>On the 26/12/2020 - 1 property was internally flooded on Market Street, Tunstead. This incident was reported by</p> <ul style="list-style-type: none"><li>• a resident via an online flood report form on the 27/01/2021, (3306)</li></ul> | <ul style="list-style-type: none"><li>• Norfolk County Council (Lead Local Flood Authority) visited affected residents to offer advice and to gather information after the incident.</li><li>• A resident carried out measures to minimise the impact of flooding during the incident.</li></ul> |

## Recent rainfall within the catchment

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

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

## Historic flooding incidents within the catchment

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

| <b>Date of incident</b> | <b>Impact</b>   | <b>Rainfall intensity</b> |
|-------------------------|---|---------------------------|
| 09/03/2013              | <p>Norfolk County Council have previously investigated internal flooding on Market Street, Tunstead. Please see following link to the flood investigation report:<br/><a href="https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/flood-investigations">https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/flood-investigations</a></p> | 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.

Following flooding to people, property and infrastructure

- Risk Management Authorities should
  - communicate with affected residents where their assets have given rise to the flooding of properties.
  - review the appropriateness of their response to flooding.
  - determine the integrity and/or capacity of their assets where they have contributed to the flooding of properties to understand the systems role in accommodating normal rainfall events as well as mitigating flooding.
- Property owners of affected properties should seek their own legal advice.
- NCC should
  - incorporate all relevant information of actual flooding into the review of the Norfolk Preliminary Flood Risk Assessment (“PFRA”).
  - review and monitor the delivery of recommendations within this and other relevant flood investigation reports.

| Location and date of flooding                  | Causes of flooding   | Recommendation   | Who has responsibilities to manage the cause(s) of the flood?  |
|--|--|--|--|
| <p>Market Street,<br/>Tunstead, 26/12/2020</p> | <p>The surface water drainage system has historically been modified and amended with various sized culverts. This has created several pinch points within the system that struggle to allow free flow. During this event run off from fields contributed to overloading the drainage system which could not cope and water surcharged at various locations. The water was directed towards the affected property.</p> <p>The flooding was exacerbated by surface water connections into the foul drainage network. This system was already overloaded and so surcharged elsewhere.</p> | <ul style="list-style-type: none"> <li>• Norfolk County Council will work with riparian owners to review the capacity &amp; level of maintenance required to sustain the design efficiency of the drainage systems that serve the flooding location in line with the risk identified.</li> <li>• A relevant community organisation could map their watercourse/drainage network to aid an understanding of their local drainage network and support the community in engaging with local landowners to improve or re instate the watercourse network. RMA's could assist in providing relevant information to support this activity.</li> <li>• Residents should disconnect all illegal connections to the foul drainage network.</li> </ul> | <ul style="list-style-type: none"> <li>• Norfolk County Council (LLFA)</li> <li>• Riparian owners</li> </ul> |

## 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.

Norfolk County Council forbids the reproduction of this report or its contents by any third party without prior agreement.

## 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.

### What is a Catchment?

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

## Roles and Responsibilities of Risk Management Authorities

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

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

- 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.