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## FLOOD INVESTIGATION REPORT

### EAST HUNSBURY NORTHAMPTON

27<sup>th</sup> MAY 2018

Client: Flood and Water Management  
Northamptonshire County Council  
One Angel Square  
4 Angel Street  
Northampton  
NN1 1ED

Prepared By: Bob Turrell

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## REVISION SCHEDULE

Northamptonshire County Council  
Flood Investigation Report  
East Hunsbury, Northampton

David Smith Associates Reference: 18/30621

Rev	Date	Details	Author	Checked	Approved
01	31/01/19	Draft Report	Bob Turrell (David Smith Associates)	Ruth Burnham (Senior Flood & Water Officer, NCC)	Phil Jones (Flood & Water Manager, NCC)
02	21/03/19	Draft Report	Bob Turrell (David Smith Associates)	Ruth Burnham (Senior Flood & Water Officer, NCC)	Phil Jones (Flood & Water Manager, NCC)
03	09/08/19	Revision following additional information/consultation	Bob Turrell (David Smith Associates)	Ruth Burnham (Senior Flood & Water Officer, NCC)	Phil Jones (Flood & Water Manager, NCC)
04	09/08/19	Addresses redacted. Public version.	Bob Turrell (David Smith Associates)	Ruth Burnham (Senior Flood & Water Officer, NCC)	Phil Jones (Flood & Water Manager, NCC)

## **FOREWORD**

One of the roles of Northamptonshire County Council as the Lead Local Flood Authority (LLFA) is to carry out investigations into flooding incidents if they meet the set thresholds.

### **The LLFA will:**

- Identify and explain the likely cause/s of flooding;
- Identify which authorities, communities and individuals have relevant flood risk management powers and responsibilities;
- Provide recommendations for each of those authorities, communities and individuals; and
- Outline whether those authorities, communities or individuals have or will exercise their powers or responsibilities in response to the flooding incident.

### **The LLFA cannot:**

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

**CONTENTS**

EXECUTIVE SUMMARY..... 6

1. INTRODUCTION ..... 1

    1.1 Lead Local Flood Authority Investigation ..... 1

    1.2 Method of Investigation..... 2

2. RAINFALL ANALYSIS ..... 4

3. FLOODING HISTORY..... 6

    3.1 Previous Reports of Flooding ..... 6

4. LOCATION OF FLOODING ..... 7

    4.1 Location in Context..... 7

5. DRAINAGE SYSTEMS & WATERCOURSES ..... 10

    5.1 Drainage Systems ..... 10

    5.2 Natural Watercourses ..... 12

    5.3 Flood Resilience..... 13

6. DESCRIPTION OF FLOOD EVENT ..... 14

    6.1 Resident/Occupier Descriptions..... 14

    6.2 Rainfall and Flood Water ..... 16

    6.3 Response to Flooding ..... 18

7. CONCLUSION ..... 20

8. RECOMMENDATIONS..... 22

    8.2 Communities ..... 22

    8.3 Lead Local Flood Authority (LLFA) ..... 24

8.4	Highway Authority – Northamptonshire Highways .....	24
8.5	Water Company - Anglian Water Services (AWS) .....	25
8.6	Northampton Borough Council (NBC) .....	25
8.7	Environment Agency (EA).....	26
8.8	Developers.....	26
9.	RIGHTS AND RESPONSIBILITIES .....	27
9.1	Communities .....	27
9.2	Lead Local Flood Authority (LLFA) .....	27
9.3	Highway Authority – Northamptonshire Highways .....	28
9.4	Water Authority (Anglian Water Services) (AWS).....	28
9.5	Northampton Borough Council (NBC).....	28
9.6	Environment Agency (EA).....	29
9.7	Land Owners and Developers.....	29
	DISCLAIMER .....	31
	ACRONYMS .....	32
	USEFUL LINKS .....	32
	USEFUL CONTACTS .....	33
Appendix A		
Flood Incident Plan		
Appendix B		
May 2018. Northampton Flood Incident Investigations		
Appendix C		
Photographs		
Appendix D		
Photographs		
Appendix E		
Environment Agency Standard Notice		

## **EXECUTIVE SUMMARY**

This Flood Investigation Report (FIR) has been completed by David Smith Associates on behalf of Northamptonshire County Council (NCC) under its duties as the Lead Local Flood Authority (LLFA) in accordance with [Section 19 of the Flood and Water Management Act 2010 \(F&WMA\)](#).

### **Statutory Context**

Section 19 of the F&WMA states that on becoming aware of a flood which meets certain pre-determined criteria, the LLFA must undertake a formal flood investigation in order to determine the relevant flood risk management authorities involved and which flood risk management functions have been, or should be taken to mitigate future flood risk. Where an authority carries out an investigation it must publish the results.

Within the Northamptonshire Local Flood Risk Management Strategy the approved thresholds for undertaking a FIR are:

A formal flood investigation will be carried out if one or more of the following occurs:

- Flooding affecting critical infrastructure\* for more than three hours from the onset of flooding;
- Internal flooding\*\* of a building has been experienced on more than one occasion in the last five years; and/or
- Internal flooding of five buildings in close proximity\*\*\* has been experienced during a single flood incident.

\* Those infrastructure assets (physical or electronic) that are vital to the continued delivery and integrity of essential national services, the loss or compromise of which would lead to severe economic or social consequences, or to loss of life.

\*\* A situation in which a building (commercial or residential) has been flooded internally, i.e. water has crossed the threshold and entered the building. This includes;

- Basements and ground level floors of the building;
- Garages/outbuildings if they are integral to the main occupied building. Garages adjacent or separate from the main occupied building are not included;
- Occupied static caravans and park homes. Tents are not included.

\*\*\* Where it is reasonable to assume that the affected properties were flooded from the same source, or interaction of sources, of flooding.

**See over for additional notes**

**Notes:**

- The LLFA will not investigate incidents of structural dampness or where basements are affected by groundwater entering through cracks in the basement walls or floor.
- In the event that the cause of, and the responsibility for addressing the flooding is well understood, no formal investigation will be undertaken.
- The LLFA will only undertake a flood investigation if the incident is formally reported within nine months of the flood event occurring.
- In addition to internal flooding of occupied buildings, affected properties shall also include those properties (commercial or residential) where water has entered gardens or surrounding areas which restricts access, or where flooding has disrupted essential services to the property such as sewerage or electricity supply. For businesses, this includes those where the flood waters are directly preventing normal trading practices.

**Flooding Incident**

It was deemed necessary to complete a formal investigation into the flood incident at East Hunsbury, Northampton that occurred on Sunday 27<sup>th</sup> May 2018. Internal flooding of more than five residential or commercial buildings in close proximity occurred during a single incident. This meets the threshold for investigation as set out above.

**Cause of Flooding**

The flooding was caused by intense heavy rainfall. Surface water drainage systems were unable to collect and convey rainwater effectively. This led to excess surface water flowing over ground following natural contours to low points around residential property.

**Main Conclusion**

Following this report, the local community and relevant authorities must continue to work together, sharing information and reports, and consider implementing the key recommendations set out in Section 8 of this report.

# 1. INTRODUCTION

## 1.1 Lead Local Flood Authority Investigation

### 1.1.1 Purpose of Investigation

1.1.1.1 Section 19 of the Flood and Water Management Act (F&WMA) states:

- (1) On becoming aware of a flood in its area, a Lead Local Flood Authority must, to the extent that it considers it necessary or appropriate, investigate:-
  - a. which risk management authorities have relevant flood risk management functions, and
  - b. whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.
- (2) Where an authority carries out an investigation under subsection (1) it must:-
  - a. publish the results of its investigation, and
  - b. notify any relevant risk management authorities.

Within the Northamptonshire Local Flood Risk Management Strategy the thresholds for undertaking a Formal Investigation Report in the County have been determined as:

A formal flood investigation will be carried out if one or more of the following occurs:

- Flooding affecting critical infrastructure\* for more than three hours from the onset of flooding;
- Internal flooding\*\* of a building has been experienced on more than one occasion in the last five years; and/or
- Internal flooding of five buildings in close proximity\*\*\* has been experienced during a single flood incident.

\* Those infrastructure assets (physical or electronic) that are vital to the continued delivery and integrity of essential national services, the loss or compromise of which would lead to severe economic or social consequences, or to loss of life.

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- Garages/outbuildings if they are integral to the main occupied building. Garages adjacent or separate from the main occupied building are not included;
- Occupied static caravans and park homes. Tents are not included.

\*\*\* Where it is reasonable to assume that the affected properties were flooded from the same source, or interaction of sources, of flooding.

**See over for additional notes**



**Notes:**

- The LLFA will not investigate incidents of structural dampness or where basements are affected by groundwater entering through cracks in the basement walls or floor.
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- In addition to internal flooding of occupied buildings, affected properties shall also include those properties (commercial or residential) where water has entered gardens or surrounding areas which restricts access, or where flooding has disrupted essential services to the property such as sewerage or electricity supply. For businesses, this includes those where the flood waters are directly preventing normal trading practices.

**1.1.2 Flood Incident**

- 1.1.2.1 It was deemed necessary to complete a formal investigation into the flood incident at East Hunsbury, Northampton that occurred on Sunday 27th May 2018. Internal flooding of more than five residential or commercial buildings in close proximity occurred during a single incident. This meets the threshold for investigation as set out above.

**1.2 Method of Investigation****1.2.1 Information Provided**

- 1.2.1.1 Northamptonshire County Council (NCC) provided relevant mapping and data to assist with the investigation. This included water & sewerage company maps, highway asset maps, geology and groundwater flood risk maps, records of past flood events and rainfall data.
- 1.2.1.2 NCC provided specific addresses and contact details of properties that had reported flooding to the Flood Toolkit website. Limited details were provided of other properties where flooding had been reported anecdotally, or through other local authorities.

**1.2.2 Public Engagement**

- 1.2.2.1 A walkover of the area of flooding was carried out on 1<sup>st</sup> August 2018 to inspect the general topography and relevant features. This included visiting residents known to have flooded to fill out the Flood Investigation Question Sheet.
- 1.2.2.2 Residents and businesses who reported flooding via the County Council's Flood Toolkit were written to and emailed to advise them of the site visit, together with a Flood Investigation Question Sheet that could be completed and returned.
- 1.2.2.3 County and District Councillors were written to and emailed to inform them of the investigation and the site visit, with an invitation to attend.
- 1.2.2.4 As the site visit and interviews proceeded, additional properties known to have flooded were brought to the attention of the Investigating Officer. These properties were visited to attempt to interview the resident. If no-one was available at these properties an explanatory letter and Flood Investigation Question Sheet was hand delivered, with a pre-paid return envelope.

### **1.2.3 Local Authority Engagement**

1.2.3.1 Interviews were held with local authorities with flood risk management roles to understand their response to the flood incident.

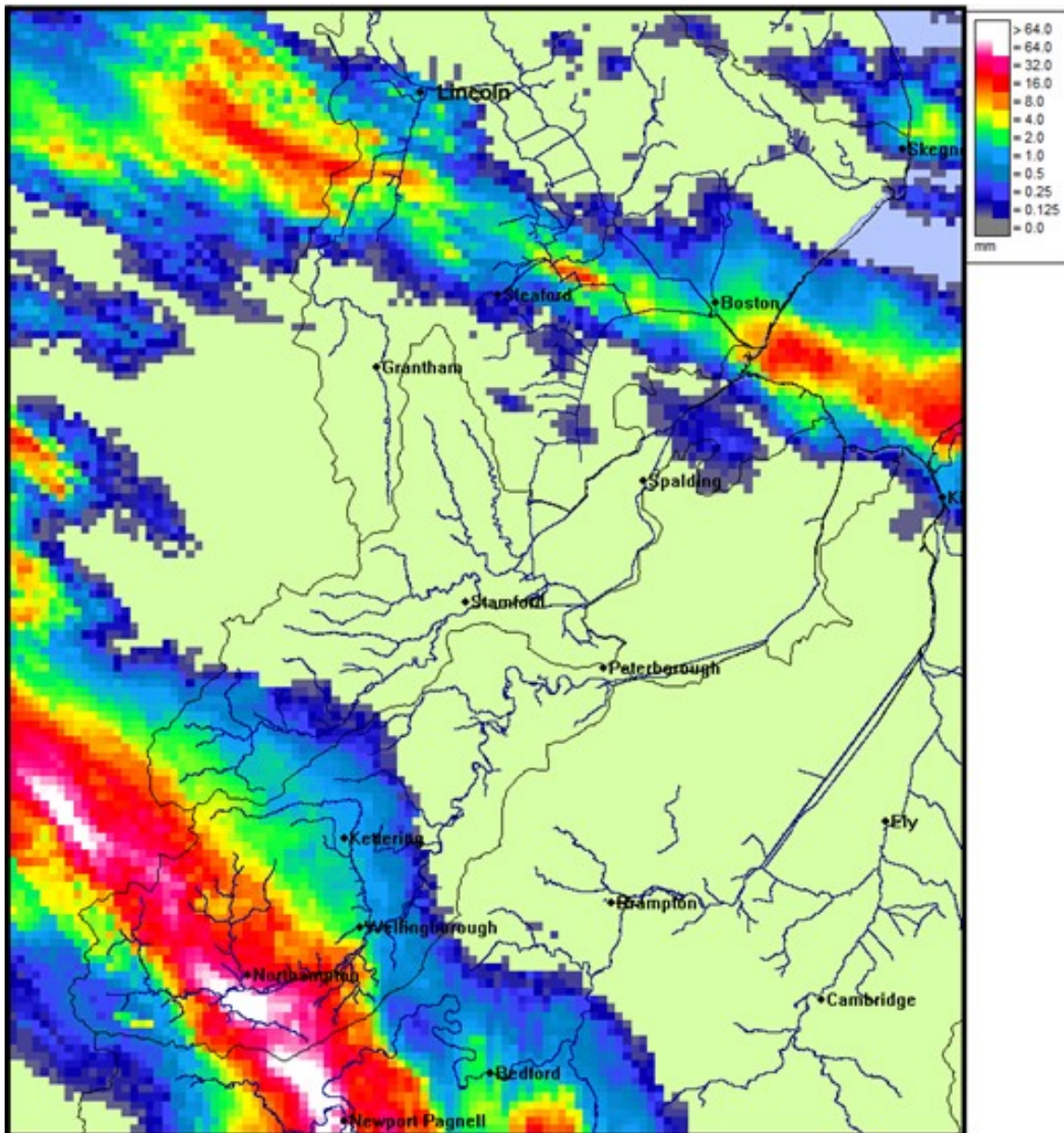
1.2.3.2 These included

- Northampton Borough Council
- Northamptonshire County Council, Flood & Water Management Team
- Northamptonshire County Council, Emergency Planning Team
- Environment Agency
- Northamptonshire Highways
- Anglian Water
- Fire and Rescue

## 2. RAINFALL ANALYSIS

### 2.1.1 General Description

2.1.1.1 Radar mapping of rainfall on the evening of 27<sup>th</sup> May 2018 indicates a narrow band of precipitation moving in a north-westerly direction across the southwest of Northampton.



2.1.1.2 The areas of exceptionally heavy rainfall are focussed in small areas shown white on the radar map. These are areas where in excess of 64mm of rainfall fell.

2.1.1.3 This led to highly localised areas of intense heavy rainfall which would only affect specific areas and would only be recorded by rain gauges in the immediate vicinity.

## **2.1.2 Rain Gauges**

- 2.1.2.1 Northamptonshire County Council rain gauges recorded highs of 17.8mm over the day in Moulton Park, 15.0mm over the day in Tiffield and 13.6mm over the day in Naseby. The six other operational rain gauges around the county recorded less than 10mm over the day.
- 2.1.2.2 EA rain gauges recorded 27mm in half an hour and 35mm in 2 hours in Quinton. The only other rain gauge which recorded more than 20mm in the event was Yardley Hastings with 19mm in half an hour and 22mm in 1hr. Other rain gauges around Northampton recorded around 10mm during this event.
- 2.1.2.3 AWS reported that rainfall radar recorded 93mm in one hour in Wootton.
- 2.1.2.4 The private Northampton Weather <http://www.northamptonweather.org.uk/index1.php> rain gauge in Hardingstone recorded 58.8mm over 2 hours.
- 2.1.2.5 The average monthly rainfall for May is 54.4mm (MET Office Moulton Park climate station averages from 1981 – 2010).

## **2.1.3 Rainfall Return Period**

- 2.1.3.1 The Flood Estimation Handbook published by the Centre for Ecology and Hydrology provides tools to estimate the event rarity based on rainfall depth and duration.
- 2.1.3.2 The two worst case rain gauge readings have been analysed. The AWS report for Wootton suggests a 1 in 837 annual exceedance probability event (0.12% probability of occurring each year). The Northampton Weather rain gauge at Hardingstone suggests a 1 in 136 annual exceedance probability event (0.74% probability of occurring each year).

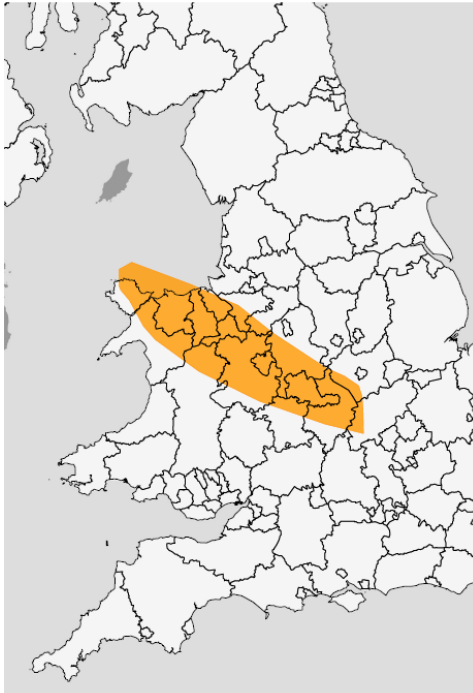
## **2.1.4 Weather & Flood Warnings**

- 2.1.4.1 The MET Office issued a yellow warning of heavy showers and thunderstorms across parts of Southern Britain through Saturday and Sunday. This included an area of the south of Northamptonshire, south of Daventry and Northampton.
- 2.1.4.2 The MET Office issued an amber warning of thunderstorms across parts of the Midlands and into north Wales through Sunday afternoon and into the evening. This included an area of the west of Northamptonshire, covering Daventry and Woodford Halse.
- 2.1.4.3 A guide to Met Office Weather Warnings can be found at: <https://www.metoffice.gov.uk/guide/weather/warnings>
- 2.1.4.4 This level and location of weather warnings would not have instigated any specific preparation or response from Flood Risk Management Authorities or Emergency Services.



Amber warning  
**Rain**

Between  
**16:48 Sun 27 May 2018** and  
**21:00 Sun 27 May 2018**



**Thunderstorms will continue across parts of the Midlands and into north Wales through the rest of Sunday afternoon and into the evening**

#### What to expect

- Flooding of homes and businesses is likely and could happen quickly, with damage to some buildings from floodwater, lightning strikes, hail or strong winds
- Spray and sudden flooding probably leading to difficult driving conditions and some road closures as well as some delays or cancellations to train and bus services.
- Power cuts likely to occur and other services to some homes and businesses could be lost

### **3. FLOODING HISTORY**

#### **3.1 Previous Reports of Flooding**

- 3.1.1.1 There was major flooding in the Wootton and Collingtree Park areas of Northampton in 2007. This was understood to have been due to the channel capacity of the Wootton Brook being exceeded.
- 3.1.1.2 Three properties in Lichfield Drive were internally flooded on 16<sup>th</sup> June 2007, reported by Fire & Rescue.
- 3.1.1.3 Two residents reported previous flooding in Lichfield Drive in June 2007.
- 3.1.1.4 A resident in Swallow Drive reported previous flooding to Rowtree Road in August 2012.

## **4. LOCATION OF FLOODING**

### **4.1 Location in Context**

#### **4.1.1 Catchment Area**

4.1.1.1 The affected area of East Hunsbury is located in a surface water catchment area that is bounded by Grangewood Park to the west and Penvale Park to the east.

4.1.1.2 Grangewood Park is a natural valley that runs north to south for approximately 550 metres, between the Tesco Supermarket site on Clannell Road and Rowtree Road.

4.1.1.3 Penvale Park is another natural valley that runs east to west for approximately 900 metres, between the site of Wootton Police Headquarters and Hilldrop Road

4.1.1.4 The catchment is predominantly urban with approximately 80% developed with the remaining as open space.

#### **4.1.2 Affected Areas**

4.1.2.1 Flooding was experienced in various localised areas across the south of Northampton. Flooding was also experienced in Milton Keynes and Buckinghamshire, Warwickshire, the West Midlands and Birmingham.

4.1.2.2 The focus of this investigation is the effect on the areas around Rowtree Road, Swallow Close, Lichfield Drive and Marlowe Close. The flooding in these areas concurs with the areas shown to be at risk of flooding from surface water shown on the long term flood risk mapping.

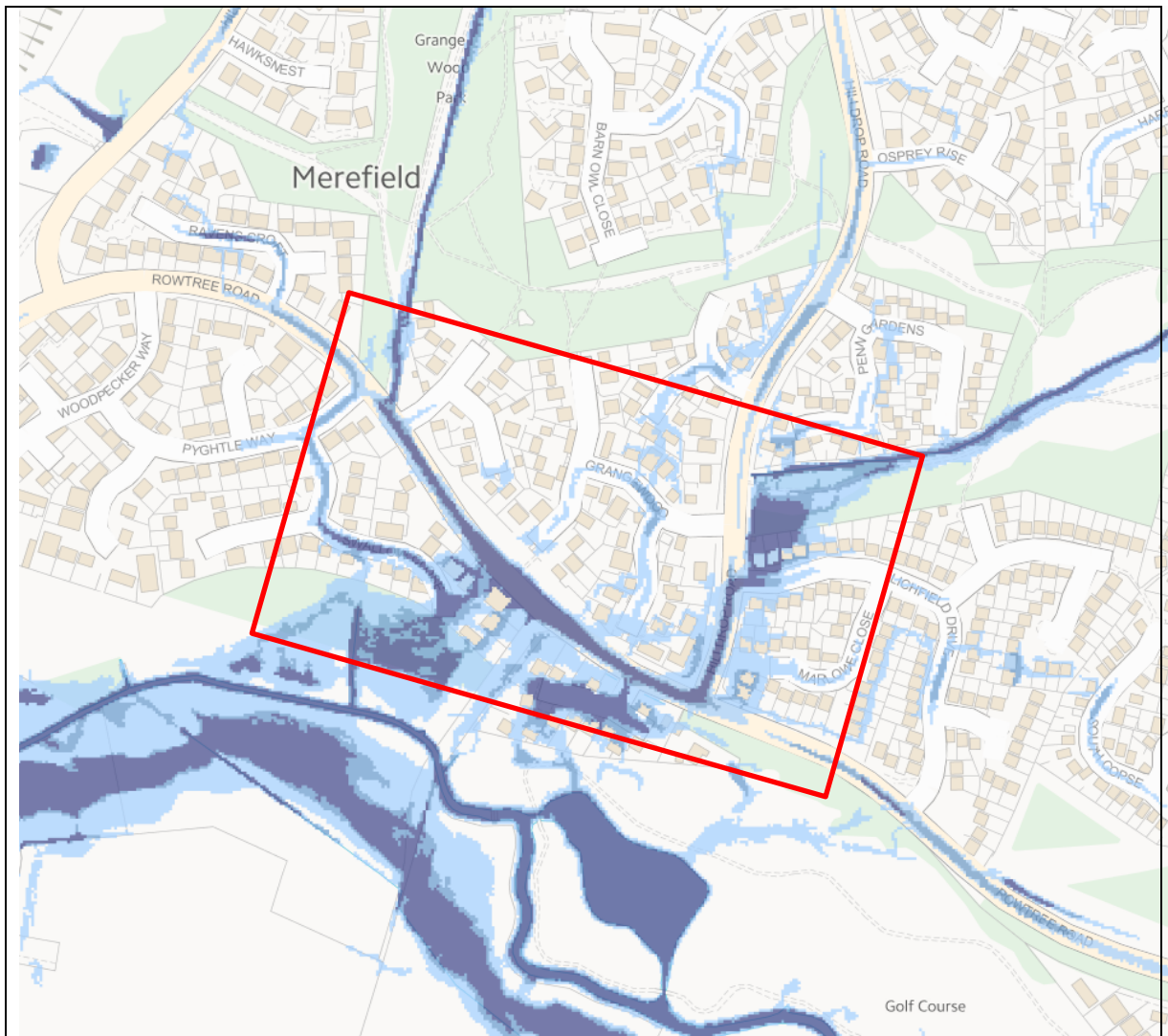
4.1.2.3 Other locations in Northampton are the subject of separate Section 19 (FWMA) investigations and reports. These are shown on the plan in Appendix B.

#### **4.1.3 Long Term Flood Risk Mapping**

4.1.3.1 Long Term Flood Risk Mapping is available from <https://www.floodtoolkit.com/risk/> and <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>

4.1.3.2 The maps are intended for guidance, and cannot provide details for individual properties. The maps have been produced by the Environment Agency.

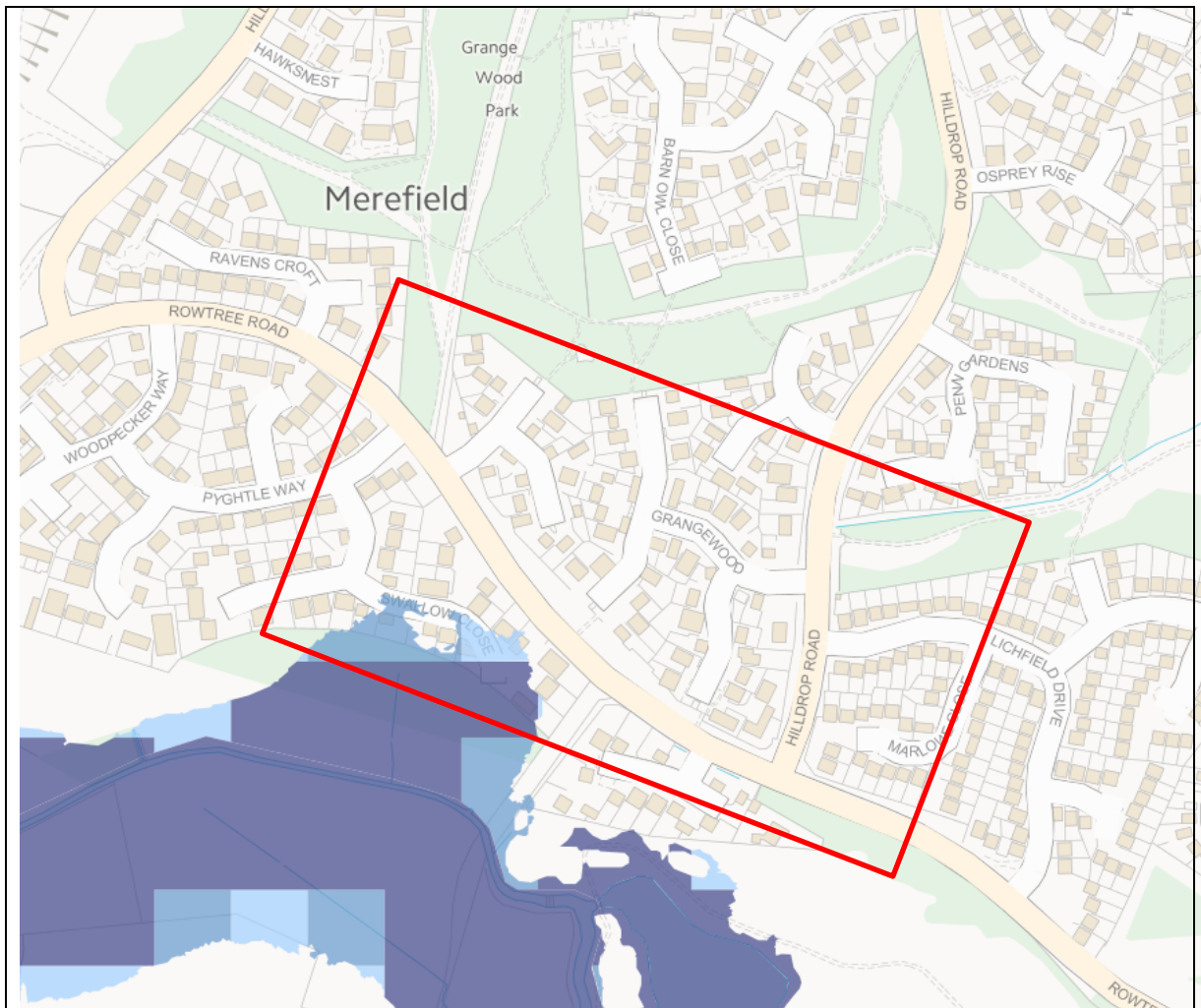
### 4.1.3.3 Flood Risk from Surface Water



	<p>This is in an area that has a <b>HIGH</b> chance of flooding from surface water. This means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%).</p>
	<p>This is an area that has a <b>MEDIUM</b> chance of flooding from surface water. This means that each year, this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).</p>
	<p>This is an area that has a <b>LOW</b> chance of flooding from surface water. This means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).</p>
	<p>This is an area that has a <b>VERY LOW</b> chance of flooding from surface water. This means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%).</p>

Source: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>  
 © Environment Agency copyright and database rights 2018

#### 4.1.3.4 Flood Risk from Rivers or the Sea



	<p>This is in an area that has a <b>HIGH</b> chance of flooding from rivers. This means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%).</p>
	<p>This is an area that has a <b>MEDIUM</b> chance of flooding from rivers. This means that each year, this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).</p>
	<p>This is an area that has a <b>LOW</b> chance of flooding from rivers. This means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).</p>
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Source: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>  
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## **5. DRAINAGE SYSTEMS & WATERCOURSES**

### **5.1 Drainage Systems**

#### **5.1.1 Public Sewers**

- 5.1.1.1 AWS are responsible for the separate foul and surface water public sewer systems which exist throughout this residential area, and which drain the wider catchment.
- 5.1.1.2 A 450mm diameter surface water sewer runs from north to south under Grangewood Park, joining an 825mm diameter pipe on Rowtree Road.
- 5.1.1.3 The main surface water sewer beneath the affected area of Rowtree Road is an 825mm increasing to 1050mm diameter pipe. This flows from north-west to south-east before combining with a smaller 150mm diameter sewer from the south-east. At this point it heads south-west in a 1050mm to its outfall into Wootton Brook.
- 5.1.1.4 The affected area of Swallow Close is served by a 225mm diameter pipe running east to west that combines with a 450mm diameter pipe and which heads south to an outfall into a watercourse which in turn connects to Wootton Brook.
- 5.1.1.5 A 900mm diameter surface water sewer runs from east to west under Penvale Park joining a 1050mm diameter pipe at Hilldrop Road. This continues south to Rowtree Road and then south-east, becoming 1125mm diameter before turning due south via a 2100mm diameter pipe to its outfall into Wootton Brook.
- 5.1.1.6 The main surface water sewer serving the affected area of Lichfield Drive is a 375mm diameter pipe flowing east to west connecting to the 1050mm diameter pipe on Hilldrop Road.
- 5.1.1.7 The main surface water sewer serving the affected area of Marlowe Close is a 225mm diameter pipe flowing east to west increasing to a 300mm diameter pipe before connecting to the 1050mm diameter pipe on Hilldrop Road.
- 5.1.1.8 New surface water public sewers are generally required to have capacity for the 1 in 30 annual exceedance probability event without flooding. They receive surface water from private roofs and paved areas, and the public highway.
- 5.1.1.9 Historic drainage systems that have become the responsibility of AWS may not have been designed to any specific standard.
- 5.1.1.10 Planned inspection and maintenance is carried out to surface water sewer outfalls, controls and structures. This is carried out at a frequency determined by any previous issues at the location.
- 5.1.1.11 All maintenance was reported to have been carried out within the relevant timeframe with no issues highlighted.

## **5.1.2 Highway Drainage**

- 5.1.2.1 Rowtree Road, Swallow Close, Hilldrop Road, Lichfield Road and Marlowe Close are identified as NCC maintained Highway.
- 5.1.2.2 The Highway Authority, Northamptonshire Highways, is responsible for road gullies and the pipework that connect these to the main drainage system.
- 5.1.2.3 Rowtree Road, Swallow Close, Hilldrop Road, Lichfield Road and Marlowe Close are served by a system of road gullies in the carriageway channels along the length of the roads.
- 5.1.2.4 Road gullies are normally provided to drain surface water from the public highway only, with no allowance for additional flow from private property.
- 5.1.2.5 Modern highway drainage systems are designed to have capacity for the 1 in 5 annual exceedance probability event. Historic highway drainage systems that have become the responsibility of the Highway Authority due to dedication, as opposed to adoption, may not have been designed to any standard.
- 5.1.2.6 Highway drainage is required to remove water in normal wet weather conditions so that the carriageway is safe for vehicular traffic, and to reduce structural damage to pavements caused by water.
- 5.1.2.7 The gullies in in the area are inspected by Northamptonshire Highways on a cyclical basis. 98% of manholes, catch pits and gullies are reported to have been cleaned within the period of 27th May 2016 to 27th May 2018 as part of the cyclical regime.
- 5.1.2.8 Post flooding event 94% of manholes, catch pits and gullies are reported to have been cleaned within the period of 27th May 2018 to 25th October 2018.

## **5.1.3 Private Drainage**

- 5.1.3.1 Private residential and commercial properties generally have their own drainage systems to collect surface water and convey this to an outfall. These comprise roof gutters and downpipes, and yard gullies.
- 5.1.3.2 The outfall is usually a soakaway, watercourse or public sewer. In the Wootton area and the wider catchment area, the most likely outfall for most private drainage systems is the surface water public sewer.
- 5.1.3.3 Individual property owners are responsible for their drainage systems. Various design standards will have applied over the catchment area as development progressed in this area during the 20<sup>th</sup> Century. Drainage systems with a capacity for the 1 in 5 annual exceedance probability event might be expected.

#### **5.1.4 Other Unrecorded Drainage**

5.1.4.1 There are no specific unrecorded drainage systems identified that relate to the flooding incident.

### **5.2 Natural Watercourses**

#### **5.2.1 Open Watercourses**

5.2.1.1 An open watercourse runs from north to south within Grangewood Park becoming culverted under Rowtree Road. It is understood that this connects to the AW system in Swallow Close as described above in 5.1.1.4.

5.2.1.2 An open watercourse runs east to west within Penvale Park becoming culverted under Hilldrop Road. It is understood that this culvert then turns south emerging to open watercourse south of Grangewood before becoming culverted once more to an unknown outfall.

5.2.1.3 The above watercourses (where open) are within parks land owned and maintained by Northampton Borough Council.

5.2.1.4 These watercourses were reported to be blocked at the culvert entry point and becoming deeper and overflowing from the watercourse channel to flow overland to low points.

5.2.1.5 Wootton Brook is located approximately 120 metres south of Rowtree Road.

5.2.1.6 Wootton Brook is classified as a Main River. Main Rivers are those shown on the Statutory Main River Maps held by the EA. Whilst the EA has permissive powers to carry out works of maintenance and improvement to manage flood risk on these rivers, [Riparian](#) (private) ownership and maintenance responsibilities are still applicable.

5.2.1.7 Wootton Brook is reported to have responded well to the rainfall with no risk of flooding caused by increased water levels within it. EA monitoring equipment demonstrates that the rivers only responded very modestly and had significant remaining capacity to accommodate surface water. This concurs with the flooding being from surface water from higher ground rather than from main river sources.

#### **5.2.2 Buried Watercourses**

5.2.2.1 It was reported by affected residents that the culvert entrances from the open watercourses were blocked in both Grangewood Park and Penvale Park.

5.2.2.2 The culvert entrance from Grangewood Park has a brick headwall however, at the time of the walkover/visit it was not possible to see if a grille was present at the pipe entrance as it was buried and not visible.

5.2.2.3 The culvert entrance from Penvale Park has a brick headwall with a metal grille, at the time of the walkover/visit the downstream culvert exit was open and clear.

### **5.2.3 Structures**

5.2.3.1 Although there are no specific structures on the natural watercourses, that relate to the flooding incident, the upstream watercourse channel in Grangewood Park was heavily silted and covered in debris. The watercourse in Penvale Park was also heavily silted.

5.2.3.2 To the rear of Lichfield Drive there is an electricity sub-station located within the area of flooding. Although not affected on this occasion its juxtaposition to the flooding event should be noted to ensure it is considered for potential resilience measures.

## **5.3 Flood Resilience**

### **5.3.1 Community or Property Level Resilience Measures**

5.3.1.1 There were no reports of the existence of any community or property level resilience facilities in the area that could have been deployed to reduce flood risk.

## 6. DESCRIPTION OF FLOOD EVENT

### 6.1 Resident/Occupier Descriptions

#### 6.1.1 Questionnaire and Interview Responses

6.1.1.1 The responses have been tabulated below. All responses are the opinions of the residents/occupiers only.

Address	Commercial /Residential  Internal/ External Flooding	Time of Flooding and Duration. When able to return to property	Water Ingress and Egress Locations. Depth of Flooding. Areas Affected	Flooding to external areas and streets	Services Affected eg electric	Action Taken.	Drainage issues known about	Contact with Emergency Services/Local Authorities	Recurrence
Swallow Close	R  Int	19:00-20:00 hrs receding at 22:00 hrs Remained at property.	Through wall to rear of garden into rear conservatory doors. Internally flooding to 15mm and externally to 100mm. Conservatory flooded only.	Fast flowing along Rowtree Road then through wall to rear of property, increased in depth around the rear of the property and then down between adjacent properties and onto Swallow Close.	Mains fuse tripped due to floor mounted socket but otherwise ok.	Moved furniture from conservatory.	Culvert at bottom of Grangewood Park is blocked. Used to see small road sweeper every Tuesday but not seen one for at least 5 years.	None	August 2012 – flooding to Rowtree Road but not as deep. Only property affected was the garden of neighbour. Reported to council – contributory factor was blocked culvert under Rowtree Road
Swallow Close	R  Int	19:30 hrs receding after 3 hours.	Conservatory doors and air bricks at back of conservatory. Internally flooded to 250mm and externally to 450mm. Conservatory was flooded.	Water came to side of property from Rowtree Road, similar to Niagara Falls, all grass cuttings from Rowtree Road entered the garden.	Electrics tripped, it took an hour before we could switch it back on.	None, it happened so quick.	The drains in Rowtree Road. Grass had been cut but was not cleared. The grass was on verges and on the road.	Did not contact	None, only been here for a year
Lichfield Drive	R  Int	Just after 20:00 hrs with water receding from 23:30 hrs. Family moved out for a week whilst parents remained.	Mainly from back garden into patio doors and side of house into kitchen then through front door, house was surrounded by water. Internally the water was above knee height in the lounge and kitchen hall. Deeper in the garage/room and lean to on side of house. Whole ground floor was flooded.	Direction from behind house from brook area. Direction from front of house was down street filtering off to other houses, water was fast flowing and increased in depth around the house, other properties were also flooded.	Electricity lost – restored next evening. Telephone and tv out of service for a week.	No time to clear anything.	Brook behind house overgrown with foliage. Drains not cleared.	Called fire service on night of flood because of flooding in local area, they did not get to property till 23:30 hours	Flooded June 2007. Brook flooded behind house and flooded back garden/side house lean to and front garage room.
Lichfield Drive	R  Int	18:00 – 19:00 hrs and receding at about midnight. Have returned to property with temporary kitchen provided on driveway.	Predominantly from the back of the rear garden and came into the property through all doors, starting in garage and then rear side and front. Internally flooded to 450mm externally to about 600mm. Whole of the ground floor was affected.	Fast flowing from the rear and then built up around the house. Surface water flow on Lichfield Drive, but this did not come over the driveway. Fast flowing down Hilldrop Road and around junction with Lichfield drive. Also flooded at junction with Rowtree Road.	Phone only, electric was switched off.	Started with towels at the doors but soon realised that this would not be sufficient. Also moved things upstairs.	Gullies were cleared shortly after the event, within the next few days. Blockages in culvert and watercourse in Penvale Park.	Fire & Rescue called by neighbour – attended at midnight	Yes, 13 years ago – same mechanism but less extensive.
Lichfield Drive	R  Int	18:00 hrs + receding at 22:00 hrs + Remained at property.	Predominantly from the rear of the property and entered from all directions, flowing around the house then built up against the property. Internally flooded to 75-100mm, externally 250-300mm at the front and 450mm to the rear. Affected the whole of the ground floor.	Run off from Penvale Park built up across the park and against the rear fencing of the property. There was also flooding to the junction of Lichfield Drive and Hilldrop Road – massive pool of water.	Electric – temporary loss of power.	Unable as coming in 3 doors at once.	Brook in Penvale Park overgrown and not maintained and possible blocked culvert under the road. Residents personal feelings are that flood prevention measures are needed for this area.	Yes, Fire & Rescue – came later that night	Yes, 2 neighbouring properties have previously flooded.

Address	Commercial /Residential  Internal/ External Flooding	Time of Flooding and Duration. When able to return to property	Water Ingress and Egress Locations. Depth of Flooding. Areas Affected	Flooding to external areas and streets	Services Affected eg electric	Action Taken.	Drainage issues known about	Contact with Emergency Services/Local Authorities	Recurrence
Lichfield Drive	R  Int	Approximately 20:00 hrs receding by about 08:00 hrs the next day. Had to move out awaiting repairs to enable return.	From rear of garden and then surrounded the property and through all external doors. Internally flooded to 150mm, garage flooded to 200mm and externally flooded to 600mm. Whole ground floor affected.	The park at the back of our property has a brook which overflowed due to a torrential downpour thus flooded the house plus another 4 houses. Property potentially flooded in Penn Gardens?	Phone – turned off power.	Kept doors closed and moved some furniture upstairs.	Watercourse overgrown in Penvale Park and Culvert under Hilldrop Road blocked/undersize. Need to check that the culvert is large enough to take the volume of water. Also does the brook need to be banded to prevent these houses from flooding again? Grass cutting blocked gullies. Action needs to be taken quickly to make sure that this does not happen again.	Not contacted.	Not at this property.
Lichfield Drive	R  Int	12 hours before it subsided.	Ground floor of property flooded with muddy water to a depth of 50-75mm, deeper in the garden.	The brook on Penvale Park broke its bank being unable to cope with the rainfall. Never been dredged since resident came here 33 years ago. The culvert to Hilldrop Road also overflowed and contributed to the ingress into the property.	None reported.	Resident was abroad when the flooding occurred and it was only through the prompt action of neighbours who moved the car off the drive to higher ground that they are not suffering an even greater loss. A scene of devastation greeted the resident on return on Tuesday 5 <sup>th</sup> June 2018.	I am still very, very upset and whilst I understand the rainfall was unprecedented I am sure the impact could have been lessened by correct maintenance of the brook.	None reported.	No previous flooding.
Marlowe Close	R  Int	20:00 hrs receding at midnight. Remained at property.	Came around the house, deeper to the front than the back, and entered through the front door and French doors to the conservatory at the rear. Internally flooded to a depth of 100mm and externally to 450mm. All ground floor, garden and driveway were flooded. Drain in the back garden overflowed.	House next door and five houses on Lichfield Drive	None.	None, happened too fast and very unexpected.	Not aware of any.	Not contacted.	No previous flooding in property or surrounding neighbours.
Marlowe Close	R  Int	About 19:30 hrs receding by 22:00 hrs Able to return to property.	Came predominantly from the front left side of the property entering the garage first then back door, front door and also appeared to come from the fireplace. Internally flooded to 175-200mm, garage flooded to 250mm and externally about 450-600mm. Whole of the ground floor was affected.	Fast flowing down Hilldrop Road, built up around property and then came into property. Other properties in Marlowe Close and Lichfield Drive also flooded.	None.	No, as it happened so quick. Managed to unplug some items where they could.	Blocked drains and an accumulation of grass being left too long before cutting by the Council, caught up in the flood water also added to the already blocked drains. The local park stream has not been cleaned out and maintained. Manhole drains were like fountains in the surrounding roads.	Yes, called Fire & Rescue.	No previous flooding.
Marlowe Close	R  Int	Approximately 18:00 hrs receding at 22:30 hrs	Ingress from back garden (due north) Hilldrop Road (due west) and west end of Marlowe Close. Entering property via back door and air bricks to west wall facing Hilldrop Road. Internally flooded to 150-225mm. Garden, patio decking, dining room, lounge, kitchen and hall. Carpets and flooring inundated up to several inches.	Not reported.	All power failed halfway through the torrential rainfall. Restored after approximately 2 hours.	Moved some items, lay towels etc. Moved cars up the street to higher ground.	Yes, street side drains blocked.	No, none from local authorities.	None.

6.1.1.2 The following properties are also anecdotally reported to have flooded by eye witnesses. This has not been confirmed with the owners/occupiers of the properties.

Marlowe Close, 1 additional property

6.1.1.3 In total, 11 properties are reported to have flooded internally in the East Hunsbury area. There may be more, but these have not been reported following engagement efforts to obtain information, which could be for various reasons.

## **6.2 Rainfall and Flood Water**

### **6.2.1 Rainfall**

6.2.1.1 The rainfall described in Section 2 fell on the catchment between approximately 19:00 and 21:00.

### **6.2.2 Direction of Surface Water Flow**

6.2.2.1 The main reported sources of flow to affect this area were from Grangewood Park and Hilldrop/Penvale Park.

6.2.2.2 To the east of the affected areas the flow came through Grangewood Park however the culvert at the end of the watercourse was blocked and hence the water built up and overflowed onto Rowtree Road.

6.2.2.3 On Rowtree Road the water flowed east to the low point in the road to the rear of Swallow Close. This subsequently increased in depth across the road and against the rear garden walls, entering a rear garden in Swallow Close via the brick voids within the wall.

6.2.2.4 Further to the east the water flowed around the end of the wall and into the access strip between Swallow Close and Collingcroft Close.

6.2.2.5 To the west of the affected area the water flow was reported to emanate from within Penvale Park. This was from both surface water flow from across the park and also overtopping of the open watercourse.

6.2.2.6 This surface water flowed to the low point within the park to the rear of Lichfield Drive.

6.2.2.7 Surface water flow was also reported down Hilldrop Road to its junction with Rowtree Road as well as into the lower end of Marlowe Close.

6.2.2.8 Surface water flow was described as fast flowing and deepening around low points adjacent to the properties.

### **6.2.3 Standing Water**

6.2.3.1 The majority of surface water from the surrounding catchment flowed to low points on Rowtree Road, Hilldrop Road and Penvale Park, to the rear of Lichfield Drive. This is consistent with those areas modelled on the Surface Water Flood Risk Mapping shown in Section 4.1.3.3.

6.2.3.2 Surface water that flowed to the rear of the properties first increased in depth against the rear walls and fencing of the gardens before flowing through and against the dwellings.

6.2.3.3 Standing water was reported to be 900mm deep or more within Penvale Park and 300-450mm deep on Rowtree Road.

6.2.3.4 Standing water drained down over a few hours following the rainfall, with most flood water around the properties subsiding by midnight on 27<sup>th</sup> May 2018. The standing water within Penvale Park was reported to remain for a period of days.

#### **6.2.4 Specific Features That May Have Affected Water Flow**

6.2.4.1 Grangewood Park and Penvale Park acted as conduits for heavy rainfall, allowing high volumes of water to flow via the open watercourses. Blockages within the watercourses created the opportunity for the water to build up and overflow to the surrounding areas.

6.2.4.2 The exit culvert to the south end of Grangewood Park was reported to be blocked prior to the event.

6.2.4.3 Parts of the open watercourse and the exit culvert to the west end of Penvale Park were reported to be blocked prior to the event.

6.2.4.4 Surface water followed the local topography through the parks onto Highways and private gardens in Rowtree Road, Swallow Close, Lichfield Drive and Marlowe Close.

6.2.4.5 The brick walls to the rear of Swallow Close effectively directed the build-up of surface water until the depth reached the brick voids.

6.2.4.6 The low topography to the rear of the properties in Lichfield Drive is a natural low point in which surface water was able to build-up.

6.2.4.7 Rear garden fencing initially held back the large build-up of water. When these structures failed under the pressure of the water this then surged into the private gardens in Lichfield Drive.

6.2.4.8 The driveways to the properties in Lichfield Road are lower than the road and hence the water pooled around and flooded the properties as there was no means for the water to escape.

6.2.4.9 There are reports that some drainage systems in the Highway were blocked and required maintenance prior to the date of the flood incident.

6.2.4.10 There are also reports of excessive grass cuttings with overgrown verges having been cut a couple of days prior to the flooding event. These are reported to have caused blockages to the road gullies in the vicinity.

6.2.4.11 Even in a fully cleansed and operational condition, the system of private drainage, road gullies and public sewers throughout the catchment would not have the capacity to collect and convey the quantity of rain experienced.

6.2.4.12 Runoff from private property and areas of open space contributed to the surface water flow in the public highway, reducing the capacity of road gullies. Road gullies throughout the catchment area would have been at capacity and ineffective very soon after the start of the storm.

6.2.4.13 Clear, well maintained drainage systems are vital to the satisfactory operation and longevity of the built environment. The flood incident was a result of an exceedance event with rainfall in excess of design capacity of drainage systems. The approximate extent and peak depth of surface water flooding experienced would have occurred regardless of the state of maintenance of drainage systems, except the speed of drain down following rainfall may have been faster in some areas.

6.2.4.14 Affected roads remained open to traffic while they were flooded.



## **6.3 Response to Flooding**

### **6.3.1 Immediate Response**

- 6.3.1.1 There was no specific MET Office warning to be prepared for the rainfall in this area, and therefore responses were based on calls for help made as the rainfall and flooding happened.
- 6.3.1.2 The response by emergency services and local authorities was therefore reactive to information being received during the emergency. Communication lines between Agencies (e.g. Police, Fire & Rescue, NBC & NCC) were affected by the volume of calls received due to the sudden nature of the rainfall and the numerous separate areas of flooding in Northampton.
- 6.3.1.3 The sudden nature of the rainfall and numerous separate areas of flooding in Northampton caused difficulties for all Agencies to ascertain precisely which areas of the town were experiencing flooding and the level of impact.
- 6.3.1.4 Fire and Rescue received over 160 emergency calls at the time of the flood incident from various areas of Northampton that were affected. This included the normal level of calls relating to fires and other emergencies.
- 6.3.1.5 Fire and Rescue sent out an initial response of personnel and equipment to several affected areas of Northampton, but most resources were subsequently diverted to St Leonard's Road based on pre-established priority criteria. This included particularly vulnerable people at risk.
- 6.3.1.6 The topography of the St Leonard's Road area also raised the priority for that area of Northampton. Its unique situation as a natural bowl could lead to standing water of increasing depth, which could have led to a protracted incident.
- 6.3.1.7 NCC Emergency Planning Team collated information from numerous sources relating to the widespread flooding, which assisted in informing and coordinating the response of the emergency services and local authorities.

### **6.3.2 Follow Up Response**

- 6.3.2.1 Recovery and response arrangements for the following day were made between Agencies and partner organisations late on the night of the flooding incident.
- 6.3.2.2 In the following days various response teams were on site in the known affected areas within the East Hunsbury area. These included:
- Northamptonshire Highways, NCC
  - Anglian Water
  - Western Power Distribution
  - Fire and Rescue
- 6.3.2.3 A recovery incident room was established at One Angel Square from midday to help co-ordinate the partnership response to the incident.

- 6.3.2.4 A Tactical Co-ordinating Group call was held at 10:00 and subsequent calls and meetings were held throughout the day and into the week, involving multiple Agencies. This gathered and organised all information that had been received about the incident from various sources. It enabled decisions on priorities and deployment to be made, with information passed to the relevant authorities, services and public. This enabled communication with affected property owners, occupiers and businesses, and provision of relevant emergency help, information, contact details and advice.
- 6.3.2.5 The Multi Agency Recovery Strategy was to:
1. Facilitate clean-up and removal of safety hazards in the affected area.
  2. Provide relevant information and advice to those affected.
  3. Provide access to emergency help to those affected by flooding.
  4. Undertake a full community impact assessment.
  5. Coordinate available assistance and relief to affected residents.
  6. Coordinate with the business sector to support economic recovery.
  7. Undertake appropriate Section 19 flood investigations.
- 6.3.2.6 Northamptonshire Highways and AWS worked over the following days to clear drains and remove flood debris.
- 6.3.2.7 Waste collection and drainage cleansing continued over the following week, including collection of damaged items left outside properties.
- 6.3.2.8 NCC opened an Information Centre for affected residents and businesses at Delapre Annexe from 11:00 on Tuesday 29<sup>th</sup> May 2018 until the evening of Thursday 31<sup>st</sup> May 2018. This was attended by NCC, NBC, Northamptonshire Highways, Local Councillors, Western Power and AWS.
- 6.3.2.9 NCC Flood and Water Management Team processed formal and anecdotal reports of flooding and instigated the Section 19 Flood Incident Investigation. Individual reports of the flood incident continued to be received by the LLFA over the following weeks.

## **7. CONCLUSION**

- 7.1.1.1 The flooding in the East Hunsbury area was caused by intense heavy rainfall beyond the design capacity of drainage systems across the catchment. This led to excess surface water flowing over ground, following localised topography to low points.
- 7.1.1.2 The blockage to the culvert from the watercourse in Grangewood Park prevented the intended flow beneath Rowtree Road. This led to a significant build-up of water at this location that overflowed onto Rowtree Road, exacerbating the conditions.
- 7.1.1.3 Long grass cuttings were also reported with the grass having been extremely overgrown and having been cut a couple of days before. These cutting were washed to the gully locations and potentially affected the efficiency of the gully by matting across the top and restricting the effectiveness of the surface water drainage.
- 7.1.1.4 The watercourse within Penvale Park was reported to have blockages preventing the free flow through the watercourse. However, the western end of the open watercourse is also not situated at the lowest point within the park and thus there is a large area to the rear of Lichfield Drive that is susceptible to flooding, as there in no means of water escape from this area. Although unaffected on this occasion there is also an electricity substation located here.
- 7.1.1.5 Whilst some Highway drainage systems were reported to need maintenance and cleansing prior to the flooding incident, this is considered unlikely that this was the difference between the flood event occurring or not occurring.
- 7.1.1.6 The East Hunsbury area is situated within a relatively large, predominantly urban surface water catchment area. Underlying topography channels the surface water in a southerly and easterly direction to the low points through the private gardens. It is shown to be at risk of surface water flooding on published Long Term Flood Risk Mapping.
- 7.1.1.7 There was no prior warning of the location and extent of heavy rainfall, or that the rainfall would be so intense and localised in the affected areas.
- 7.1.1.8 There are no community or property level resilience measures in place that could have been deployed.
- 7.1.1.9 The following are the Key Recommendations resulting from the flood incident:
- Owners of affected properties should consider preparing a Household Emergency Plan and implementing Property Level Resilience.
  - With support from Flood Risk Management Authorities, the community should make efforts to:
    - Appoint Community Flood Wardens,
    - Prepare a Community Emergency Plan,
    - Explore options for funding and contributions for schemes to manage surface water and flood risk.

- The Lead Local Flood Authority should coordinate with other Flood Risk Management Authorities to extend publicity of the existing information available in relation to flood risk at <https://www.floodtoolkit.com/> and consider further means to pinpoint the dissemination of this information to specific communities at risk of flooding.
- The Lead Local Flood Authority should work with the community and Local Authorities to assess the viability of options for engineering schemes to reduce flood risk. This might include community level flood resilience measures, improving drainage to accommodate extreme rainfall events, providing attenuation storage areas and creating formal overland flood flow routes.

## 8. **RECOMMENDATIONS**

### 8.1 **General**

- 8.1.1.1 Listed below are the recommended course of actions emanating from this formal Flood Investigation Report.
- 8.1.1.2 It is important to note that it is for the relevant responsible body or persons to assess each recommendation in terms of the legal obligation, resource implications, priority and cost/benefit analysis of undertaking such action.
- 8.1.1.3 The recommendations may be included within the Action Plan linked to the Local Flood Risk Management Strategy or in the relevant risk management authority's future work programmes, as appropriate.

### 8.2 **Communities**

(e.g. Town/Parish Council, Flood Forum, Community Groups, land owners and affected residents)

- 8.2.1.1 Review the library of flood guides on the Flood Toolkit. NCC has produced a number of flood guides covering various subjects, some of which relate to this flood incident. The relevant guides have been identified and are available at:

<http://www.floodtoolkit.com/pdf-library/>

No.	Flood Guide Title	Read	No.	Flood Guide Title	Read
1	Agricultural Run-Off		15	Riparian Ownership and Flood Risk	
2	Ditch Clearance		16	Flood Defence Consenting	
3	Flood Investigations	X	17	Using Agricultural Land for Attenuation	X
4	Watercourse Management	X	18	Enforcing Flood Risk Management	X
5	Flood Related Benefits of the Water Framework Directive		19	Flood Related Roles of Parish Councils and Communities	X
6	Reservoirs and Flooding		20	Buying a House: Is there a Flood Risk?	X
7	Funding for Flood Alleviation	X	21	Flood Warnings	X
8	Roles and Responsibilities for Sewers	X	22	Neighbourhood Planning and Flood Risk	X
9	Roles and Responsibilities for Highways	X	23	New Development and Emergency Flood Plans	X
10	Groundwater Flooding		24	Fisheries and Flooding	
11	What to do in a Flood Emergency	X	25	Flood Advice for Businesses	X
12	How to Protect your Home	X	26	Impacts of Flooding	X
13	Insurance and Flood Risk	X	27	Together we can Reduce Flood Risk	X
14	Using Experts for Flood Risk Assessment	X			

- 8.2.1.2 Recruit Community Flood Wardens to help coordinate the production of a Community Emergency and Flood Plan, the template for which can be found on the Flood Toolkit here:

<https://www.floodtoolkit.com/wp-content/uploads/2017/06/Community-Emergency-and-Flood-Plan-Guidance-June-2017.pdf>

This can include:

- a plan of the community showing areas at risk of flooding, especially vulnerable properties and particularly vulnerable people (e.g. elderly, medical conditions, young families);
- a plan of the community outlining the ownership and maintenance regimes of drainage systems, with contact details to report any issues;
- a list of any improvements to existing drainage systems that are required.

This information should be used to inform the basis of preparing Household Emergency Plans for vulnerable properties in this area, a template for which can be found on the Flood Toolkit here:

<https://www.floodtoolkit.com/wp-content/uploads/2017/06/Household-Emergency-Plan-June-2017.pdf>

8.2.1.3 Regularly inspecting drainage systems in the area. Report blockages or other issues to the responsible owner and the LLFA.

8.2.1.4 Explore options for Property Level Resilience. Information on Flood Prevention measures for Home Owners, Communities and Businesses can be found on the Flood Toolkit here:

<http://www.floodtoolkit.com/risk/prevention/>

These measures can apply to single properties or larger systems that can be applied to protect multiple properties and communities.

8.2.1.5 Explore catchment wide solutions such as attenuation areas (balancing ponds), rain gardens, overflow routes and tree planting, and potential funding options to take this forward.

8.2.1.6 Use the Flood Toolkit Funding Tool to find sponsors who may be willing to help fund improvement projects: <http://www.floodtoolkit.com/risk/funding/>

8.2.1.7 Continue to report flood incidents to the LLFA at: <https://www.floodtoolkit.com/emergency/report-flood/>. Endeavour to obtain as much evidence of flood events as possible, such as photographic and video evidence.

8.2.1.8 Have a Community Flood Risk Report carried out. NCC's Flood and Water Management Team can prepare flood risk reports for your community. Email: [floodandwater@northamptonshire.gov.uk](mailto:floodandwater@northamptonshire.gov.uk) with the subject title "community flood risk report for [name of your community]". Example Community Flood Risk Reports for the villages of Brigstock and Geddington can be downloaded from the Flood Toolkit here:

<http://www.floodtoolkit.com/how-to-guides/community-project/>

8.2.1.9 A Community Flood Risk Report could then be used to produce a more detailed Community Flood Risk and Mitigation Investigation. This will find specific areas in the catchment that could be inspected, improved or monitored to reduce flood risk. There are guides to help through this process, available on the Flood Toolkit here:

<http://www.floodtoolkit.com/how-to-guides/community-project/>

8.2.1.10 NCC Emergency Planning Team work with many organisations to support local people and groups to get together to use their local skills, knowledge and resources to deal with emergency situations. This can include training.

People are encouraged to work together to produce a Community Self Help Plan for the area they live in

Further information can be found at:

<https://www3.northamptonshire.gov.uk/councilservices/fire-safety-and-emergencies/emergencies/emergency-prevention-and-advice/Pages/protecting-your-community.aspx>

- 8.2.1.11 Property owners should undertake regular inspection and maintenance of their drainage systems in accordance with a defined maintenance regime. Property owners should assess the capacity of their drainage systems and identify any areas with insufficient capacity. Where this could lead to runoff to the public highway or nuisance to third party private property, improvement works should be considered.

### **8.3 Lead Local Flood Authority (LLFA)**

- 8.3.1.1 Work with the NCC Emergency Planning Team and the EA to support community based Flood Wardens, should they be recruited.
- 8.3.1.2 Work with the NCC Emergency Planning Team, the EA and other flood management authorities to support the community in the production of a Community Emergency and Flood Plan and provide advice to residents on how to explore options for property level resilience.
- 8.3.1.3 Once this investigation report has been published, work with riparian owners, parish councils and local groups within the overall surface water catchment area, reminding them of their legal responsibilities for drainage and watercourse maintenance and the benefits of doing it.
- 8.3.1.4 Continue to provide information and resources relating to flood risk, preparedness and response via the Flood Toolkit website. Consider increased, ongoing publicity of this information source.
- 8.3.1.5 Work with the community and Local Authorities to assess the viability of options for engineering schemes to reduce flood risk. This might include community level flood resilience measures, improving drainage to accommodate extreme rainfall events, providing attenuation storage areas and creating formal overland flood flow routes.

### **8.4 Highway Authority – Northamptonshire Highways**

- 8.4.1.1 Undertake regular highway drainage cleansing throughout the catchment. Identify and develop a detailed plan of their assets to share with the LLFA and the community.
- 8.4.1.2 Consider more regular inspection and maintenance of highway drainage systems in areas identified as being at risk on the Surface Water Flood Risk Mapping.
- 8.4.1.3 Assess the capacity of their assets and identify any areas with insufficient capacity for draining normal runoff from the highway. Where this leads to flood risk to properties improvement works should be considered.
- 8.4.1.4 Assess the suitability of third-party drainage systems accepting discharge from Highway Drainage systems and report any unsatisfactory areas to the LLFA.
- 8.4.1.5 Assess the viability of road closures to ensure all drains can be inspected and cleansed where required.
- 8.4.1.6 Work with the LLFA, Community and Local Authorities to assess the viability of options for engineering schemes to reduce flood risk, as detailed in 8.3.1.5.
- 8.4.1.7 Assist the LLFA in publicising the Flood Toolkit information resource.

8.4.1.8 Work with the police on how road closures can be put into effect during times of flooding.

## **8.5 Water Company - Anglian Water Services (AWS)**

8.5.1.1 Assess the sources of water entering the public sewerage system.

8.5.1.2 Assess the capacity of their assets and identify any areas of insufficient capacity. Where this leads to flood risk to properties improvement work should be considered.

8.5.1.3 Continue to update the detailed plan of their assets to share with the LLFA and the Community. Work with property owners to identify drainage that may be transferred to Anglian Water under the Private Sewer Transfer.

8.5.1.4 Work with the LLFA, Community and Local Authorities to assess the viability of options for engineering schemes to reduce flood risk, as detailed in 8.3.1.5.

8.5.1.5 Assist the LLFA in publicising the Flood Toolkit information resource.

## **8.6 Northampton Borough Council (NBC)**

8.6.1.1 Undertake regular inspection and maintenance of riparian owned watercourses and other drainage systems in accordance with a defined maintenance regime.

8.6.1.2 Continue to consult with the EA and LLFA (Surface Water Drainage Team) as required in respect of planning applications for new developments to reduce flood risk. Aim to ensure that all works are carried out in accordance with the approved plans and documents.

8.6.1.3 Review the planning policies relating to developments in the vicinity of the flooding incident, together with any flood risk assessments and drainage designs. Consider contacting the developers to take action in the event that any items relating to surface water drainage and flood risk are not evident or ineffective in the final developments or in the construction period.

8.6.1.4 Utilise their powers under Section 20 of the Land Drainage Act 1991 to carry out drainage works.

8.6.1.5 Endeavour to assist other flood risk management authorities and land owners in the preparation of a detailed plan of assets relating to drainage and flood risk, to share with the LLFA and the community.

8.6.1.6 Carry out Street Cleaning to remove litter and detritus which could affect drainage systems.

8.6.1.7 Work with the LLFA, Community and Local Authorities to assess the viability of options for engineering schemes to reduce flood risk, as detailed in 8.3.1.5.

8.6.1.8 Assist the LLFA in publicising the Flood Toolkit information resource.

8.6.1.9 In coordination with relevant Management Organisations, consider a review of property and housing that the Borough Council are responsible for, in the context of flood risk and property level resilience. This may include advising tenants of the risk of flooding on a case by case basis.

8.6.1.10 Work with Anglian Water to identify drainage that might be applicable to the Private Sewer Transfer.



## **8.7 Environment Agency (EA)**

- 8.7.1.1 Work with the NCC Emergency Planning Team and the LLFA to support the community and, should one be recruited, a community based Flood Warden.
- 8.7.1.2 Work with the LLFA, Community and Local Authorities to assess the viability of options for engineering schemes to reduce flood risk, as detailed in 8.3.1.5.
- 8.7.1.3 Carry out engagement activity with communities in East Hunsbury on flood risk from Wootton Brook and local watercourses.
- 8.7.1.4 Assist the LLFA in publicising the Flood Toolkit information resource.

## **8.8 Developers**

- 8.8.1.1 Developers should work with local authorities to ensure all development does not increase flood risk (from any source) to the site or adjacent land and is completed in accordance with approved plans, documents, and planning policy.
- 8.8.1.2 For more information on planning policy, standards and associated guidance, see the Flood Toolkit - <https://www.floodtoolkit.com/planning/developers/>

## **9. RIGHTS AND RESPONSIBILITIES**

### **9.1 Communities**

- 9.1.1.1 Communities may consist of the Town or Parish Council, a Flood Forum, Community Action Group, affected residents and land owners, amongst others.
- 9.1.1.2 Property owners who are aware that they are at risk of flooding should take action to ensure that they and their properties are protected.
- 9.1.1.3 Communities and residents, as property owners, have responsibility for their private drainage systems. They may have riparian responsibilities if their land boundary is next to a watercourse, a watercourse runs alongside their garden wall or hedge, and / or a watercourse runs through or underneath their land.
- 9.1.1.4 Community resilience is important in providing information and support to each other if flooding is anticipated. Actions taken can include subscribing to MET Office email alerts for weather warnings, supporting a Community Flood Warden, producing a Community Emergency and Flood Plan, implementing property level resilience and moving valuable items to higher ground.
- 9.1.1.5 Anyone affected by flooding should try to document as much information about the incident as possible using the Flood Incident Report Form, which can be found at:  
<https://www.floodtoolkit.com/emergency/report-flood/>

### **9.2 Lead Local Flood Authority (LLFA)**

- 9.2.1.1 As stated within the introduction section, the LLFA has a responsibility to investigate flood incidents under Section 19 of the F&WMA.
- 9.2.1.2 The LLFA also has a responsibility to maintain a register of assets which have a significant effect on flooding from surface runoff, groundwater or ordinary watercourses (non-Main River) as detailed within Section 21 of the F&WMA.
- 9.2.1.3 The register must contain a record about each structure or feature, including the ownership and state of repair. The LLFA is also required to keep a record of flooding hotspots across the county.
- 9.2.1.4 As the responsible Lead Local Flood Authority for the affected property in Northamptonshire, NCC will be looking for support from other risk management authorities, communities and individual home owners to ensure flood incidents are reported, and any assets which have a significant effect on flood risk are recorded on the asset register.
- 9.2.1.5 While NCC can suggest possible causes of flooding, and make recommendations to ensure flood risk is mitigated as far as possible, the F&WMA does not provide NCC with the mandate or funding to act on identified causes of flooding or force risk management authorities to undertake any recommended actions.

### **9.3 Highway Authority – Northamptonshire Highways**

- 9.3.1.1 Highway Authorities have a duty to maintain the highway under Section 41 of the Highway Act 1980 but subject to the special defence in Section 58.
- 9.3.1.2 New highway drainage systems are designed to Highways England’s Design Manual for Roads and Bridges (Volume 4, Section 2). They are only required to be constructed to drain surface water run-off from within the highway catchment rather than from the wider catchment.
- 9.3.1.3 There are historic drainage systems in historic highways which can become the responsibility of the Highway Authority due to dedication, as opposed to adoption. These drainage systems may not have been designed to any standard.

### **9.4 Water Authority (Anglian Water Services) (AWS)**

- 9.4.1.1 Water and sewerage companies are responsible for managing the risks of flooding from surface water, foul water or combined sewer systems. Public sewers are designed to protect properties from the risk of flooding in normal wet weather conditions. However, in extreme weather conditions there is a risk that sewer systems can become overwhelmed and result in sewer flooding.
- 9.4.1.2 Since October 2011, under the ‘Private Sewer Transfer’, AWS adopted piped systems on private land that serve more than one curtilage and were connected to a public sewer on 1<sup>st</sup> July 2011. Sewerage Undertakers have a duty, under Section 94 of the Water Industry Act 1991, to provide sewers for the drainage of buildings and associated paved areas within property boundaries.
- 9.4.1.3 Sewerage Undertakers are responsible for public sewers and lateral drains. A public sewer is a conduit, normally a pipe that is vested in a Water and Sewerage Company or predecessor, that drains two or more properties and conveys foul, surface water or combined sewage from one point to another, and discharges via a positive outfall.
- 9.4.1.4 There is no automatic right of connection for other sources of drainage to the public sewer network. Connection is therefore discretionary following an application to connect.

### **9.5 Northampton Borough Council (NBC)**

- 9.5.1.1 Borough and District Councils have powers under Section 14 of the Land Drainage Act 1991 (LDA) to undertake flood risk management works on ordinary watercourses (non-Main River) where deemed necessary.
- 9.5.1.2 Under Section 20 of the LDA, councils have the powers to (by agreement of any person and at that person’s expense) carry out any drainage work which that person is entitled to carry out. Agreement may not be required in certain emergency or legally upheld situations. These powers are subject to consent from the LLFA.
- 9.5.1.3 The Borough Council is the Local Planning Authority and have a role in Building Control and the Building Regulations.
- 9.5.1.4 They are responsible for street cleansing and waste removal, and manage property and housing in the borough.

## **9.6 Environment Agency (EA)**

- 9.6.1.1 The EA has a strategic overview responsibility of all sources of flooding and coastal erosion under the F&WMA.
- 9.6.1.2 The responsibility for maintenance and repair of Main Rivers lies with the riparian owner, but the EA have permissive powers to carry out maintenance work on Main Rivers under Section 165 of the Water Resources Act 1991 (WRA).
- 9.6.1.3 Main River means all watercourses shown as such on the statutory Main River maps held by the Environment Agency and the Department of Environment, Food and Rural Affairs, and can include any structure or appliance for controlling or regulating the flow of water into, in or out of the channel.
- 9.6.1.4 The EA will encourage third party asset owners to maintain their property in appropriate condition and take enforcement action where it is appropriate. They may consider undertaking maintenance or repair of third party assets only where it can be justified in order to safeguard the public interest and where other options are not appropriate.
- 9.6.1.5 Wootton Brook is classified as a Main River. This is not considered to have been a factor in this flooding incident.
- 9.6.1.6 Other work carried out by the EA includes:
- Working in partnership with the Met Office to provide flood forecasts and warnings.
  - Developing long-term approaches to Flood and Coastal Erosion Risk Management (FCERM). This includes working with others to prepare and carry out sustainable Flood Risk Management Plans (FRMPs). FRMPs address flood risk in each river catchment. The Environment Agency also collates and reviews assessments, maps and plans for local flood risk management (normally undertaken by lead local flood authorities (LLFAs)).
  - Providing evidence and advice to support others. This includes national flood and coastal erosion risk information, data and tools to help other risk management authorities and inform Government policy, and advice on planning and development issues. The EA are statutory consultees of the Local Planning Authority.
  - Working with others to share knowledge and the best ways of working. This includes work to develop FCERM skills and resources.
  - Monitoring and reporting on FCERM. This includes reporting on how the national FCERM strategy is having an impact across the country.

## **9.7 Land Owners and Developers**

- 9.7.1.1 Land owners must let water flow through their land without any obstruction, pollution or diversion which affects the rights of others. Others also have the right to receive water in its natural quantity and quality. All riparian owners have the same rights and responsibilities;
- 9.7.1.2 Land owners must accept flood flows through their land, even if these are caused by inadequate capacity downstream. Legally, owners of lower-level ground have to accept natural land drainage from adjacent land at a higher level. The exception to this is where the owner of the higher level land has carried out “improvements” such that the run-off from the land cannot be considered “natural”.

- 9.7.1.3 Land owners must keep any structures, such as culverts, trash screens, weirs, dams and mill gates, clear of debris.
- 9.7.1.4 Land owners and developers are responsible for working with the Local Planning Authority to ensure that their development is completed in accordance with the planning permission and all conditions that have been imposed.

These rights and responsibilities are summarised in the Government guidance – Owning a Watercourse:

<https://www.gov.uk/guidance/owning-a-watercourse>

Advice for developers is available on the Flood Toolkit.

<http://www.floodtoolkit.com/planning/developers/>

The flood guides detailed in 4.2.1 above should also be referred to.

## **DISCLAIMER**

This report has been prepared as part of Northamptonshire 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.

Any recommended actions outlined in this FIR will be for the relevant responsible body or persons to assess in terms of resource implications, priority and cost/benefit analysis of the proposal. Moving forward, these may be included in the Action Plan linked to the Local Flood Risk Management Strategy or in the relevant risk management authority's future work programme as appropriate.

The opinions, conclusions and any recommendations in this report are based on assumptions made by David Smith Associates and Northamptonshire County Council when preparing this report, including, but not limited to those key assumptions noted in the report, including reliance on information provided by others.

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The implications for producing Flood Investigation Reports and any consequences of blight have been considered. The process of gaining insurance for a property and/or purchasing/selling a property and any flooding issues identified are considered a separate and legally binding process placed upon property owners and this is independent of and does not relate to the County Council highlighting flooding to properties at a street level.

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## **ACRONYMS**

LLFA	Lead Local Flood Authority
EA	Environment Agency
NCC	Northamptonshire County Council
NBC	Northampton Borough Council
AWS	Anglian Water Services
FIR	Flood Investigation Report
F&WMA	Flood and Water Management Act 2010
LDA	Land Drainage Act 1991
WRA	Water Resources Act 1991

## **USEFUL LINKS**

### **Highways Act 1980:**

<http://www.legislation.gov.uk/ukpga/1980/66/contents>

### **Water Resources Act 1991:**

<http://www.legislation.gov.uk/ukpga/1991/57/contents>

### **Land Drainage Act 1991:**

<http://www.legislation.gov.uk/ukpga/1991/59/contents>

### **Gov.UK Guidance – Owning a Watercourse:**

Your responsibilities and rules to follow for watercourses on or near your property, and permissions you need to do work around them.

<https://www.gov.uk/guidance/owning-a-watercourse>

### **EA - Prepare your Property for Flooding:**

How to reduce flood damage Flood protection products and services

<https://www.gov.uk/government/publications/prepare-your-property-for-flooding>

### **Northamptonshire County Council Flood and Water Management Web Pages:**

<http://www.floodtoolkit.com/>

### **Northamptonshire County Council Local Flood Risk Management Strategy:**

<https://www.floodtoolkit.com/wp-content/uploads/2017/11/Northamptonshire-LFRMS-Report-November-2017-Final-1.pdf>

### **Flood and Water Management Act 2010**

<http://www.legislation.gov.uk/ukpga/2010/29/contents>

## **USEFUL CONTACTS**

### **Northamptonshire County Council**

#### **Highways:**

Tel: Street Doctor (Highways) 0300 126 1000

Website: <http://www.northamptonshire.gov.uk/en/councilservices/Transport/roads/streetdoctor/>

Email: [highways@northamptonshire.gov.uk](mailto:highways@northamptonshire.gov.uk)

#### **Emergency Planning:**

Tel: 0300 1261012 (office hours)

Website: <http://www.northamptonshire.gov.uk/emergencies>

Email: [emergencyplanning1@northamptonshire.gov.uk](mailto:emergencyplanning1@northamptonshire.gov.uk)

#### **Flood and Water Management Team:**

Tel: 01604 366014 (Mon-Fri, 9am - 5pm)

Email: [floodandwater@northamptonshire.gov.uk](mailto:floodandwater@northamptonshire.gov.uk)

#### **Environment Agency**

General Tel: 08708 506 506 (Mon-Fri 8-6) Call charges apply.

Incident Hotline: 0800 807060 (24 hrs)

Floodline: 0345 988 1188

Website: <https://www.gov.uk/government/organisations/environment-agency>

Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

#### **Anglian Water**

Emergency Tel: 03457 145145 (select option 1)

Website:

<http://www.anglianwater.co.uk/household/water-recycling-services/sewers-and-drains.aspx>

#### **Northampton Borough Council**

Tel: 0300 330 7000 (Mon – Fri 9am to 5pm. Out of hours emergencies only)

Street Care and Cleansing: <https://www.northampton.gov.uk/info/200280/street-cleaning/294/street-cleaning-and-grounds-maintenance>

Housing: <https://www.northampton.gov.uk/info/100007/housing>

Council Housing. Northampton Partnership Homes:

<https://www.northamptonpartnershiphomes.org.uk/>

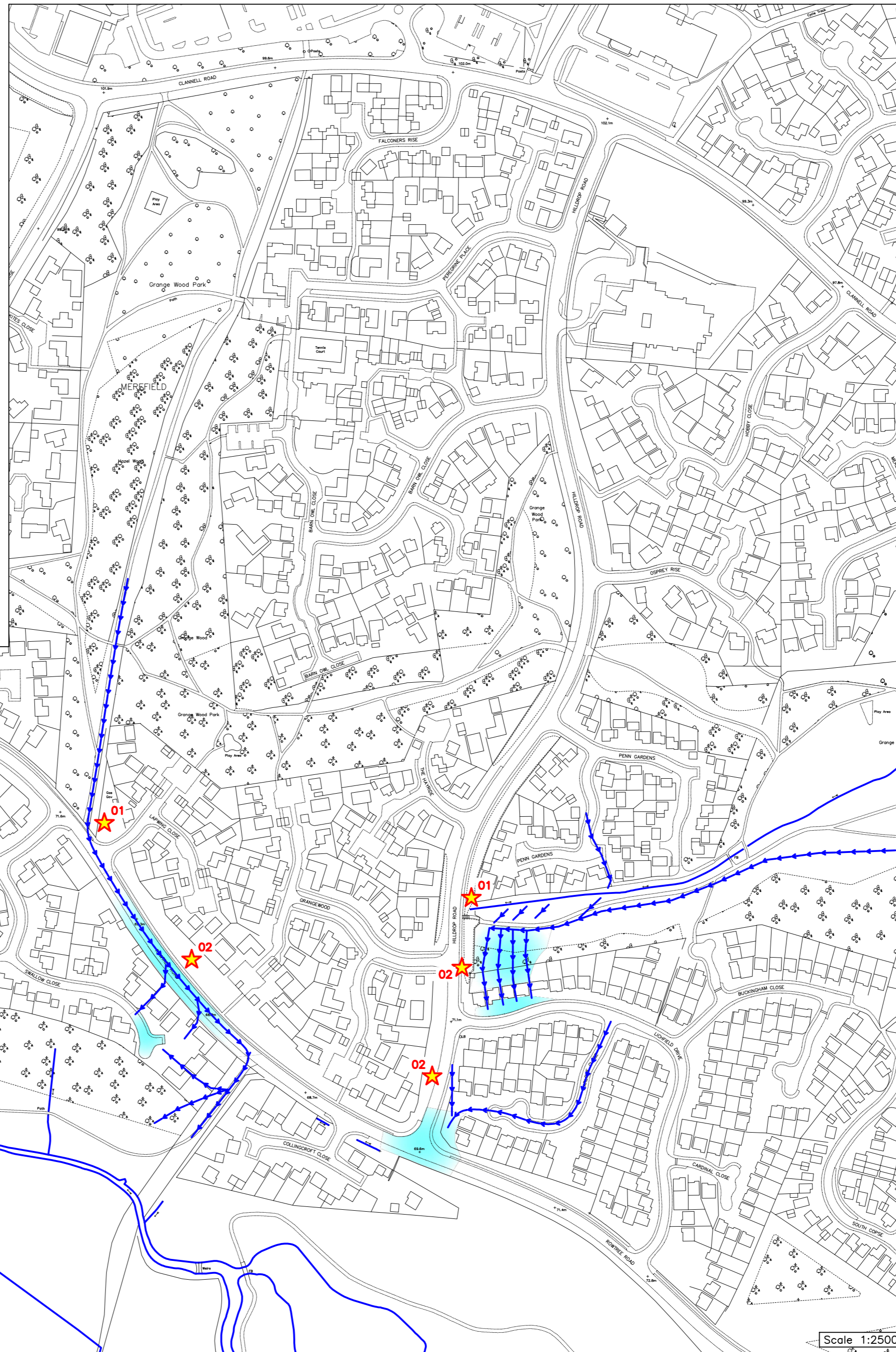
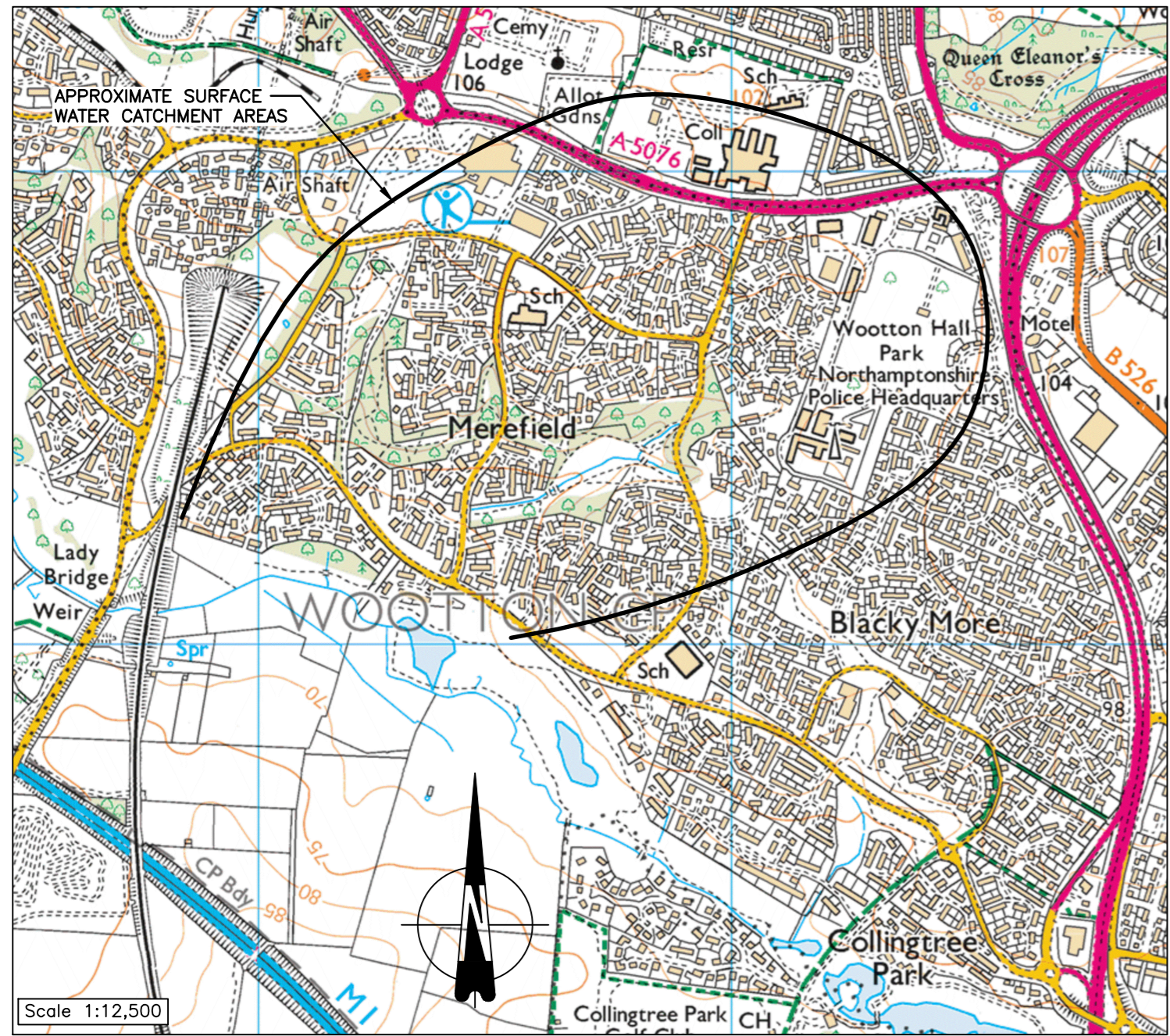
#### **The Flood Toolkit “Who is responsible” page:**





<http://www.floodtoolkit.com/contacts/>



**APPENDIX A**

**Flood Incident Plan**

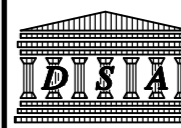


-  MAIN ROUTES OF OVERLAND FLOW DURING FLOOD INCIDENT
-  SCHEMATIC AREA OF FLOODING
-  01 BLOCKED CULVERT
-  02 GARDENS / WALLS / FENCES OBSTRUCTED SURFACE WATER FLOW

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ISSUE	REVISION	BY	DATE
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<p>CLIENT <b>NORTHAMPTONSHIRE COUNTY COUNCIL</b></p>			
<p>CONTRACT <b>SECTION 19 FLOOD INCIDENT INVESTIGATION</b></p>			
<p>TITLE <b>EAST HUNSBURY NORTHAMPTON INCIDENT PLAN</b></p>			
<p>FLOOD INCIDENT DATE <b>27th MAY 2018</b></p>			
<p>DRAWN CS</p>	<p>CH,KD RDJ</p>	<p>DATE DEC'18</p>	<p>SCALE As Shown @A2</p>
 <p><b>David Smith Associates</b> Consulting Structural &amp; Civil Engineers</p> <p>8 Duncan Close Moulton Park Northampton NN3 6WL</p> <p>Tel: (01604)782620 Fax: (01604)782629 Email: northampton@dsagroup.co.uk</p>			
<p>DRAWING NUMBER <b>18</b></p>	<p><b>30621/50</b></p>	<p>REVISION</p>	<p> </p>

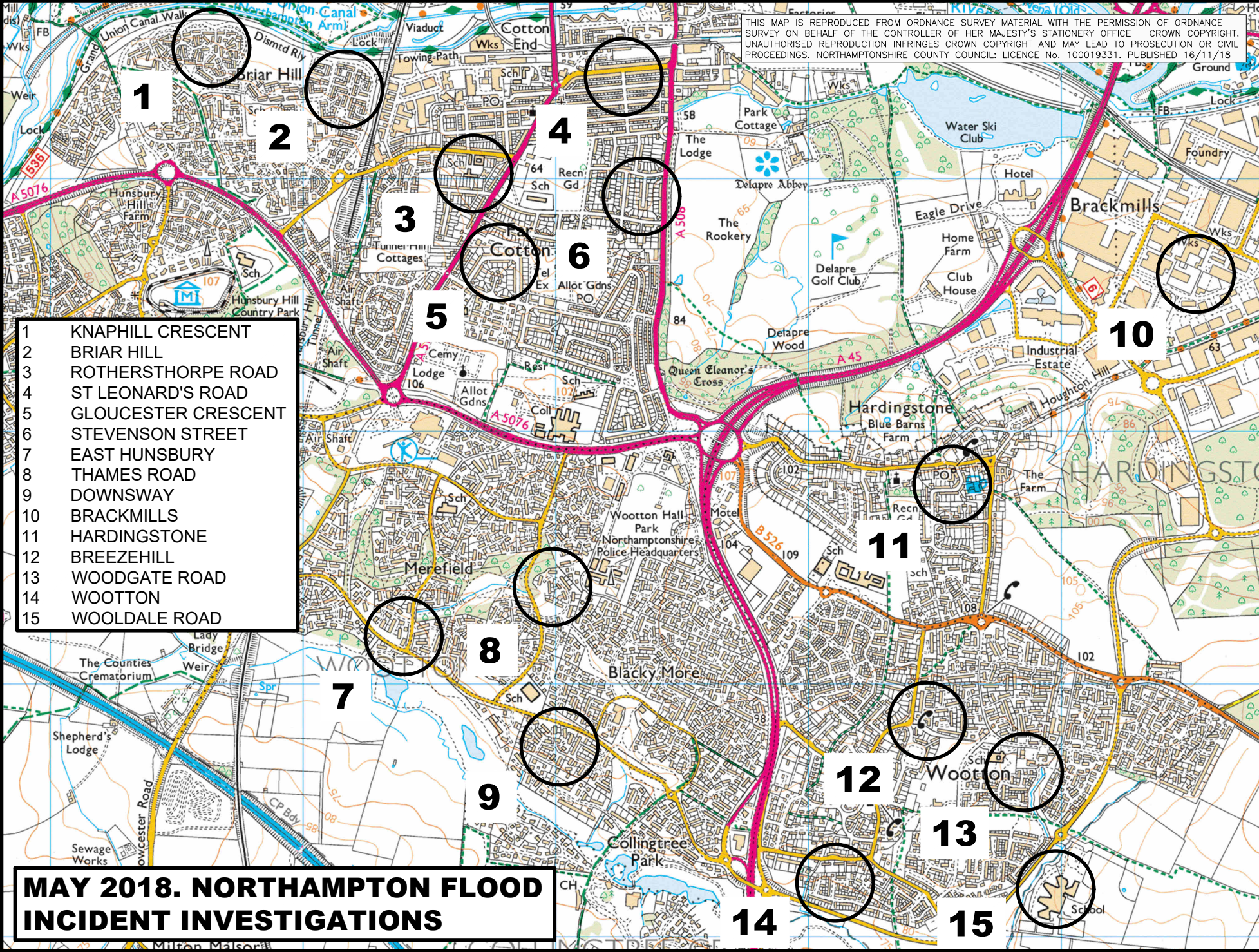
**APPENDIX B**

**May 2018. Northampton Flood Incident Investigations**

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- 1 KNAPHILL CRESCENT
- 2 BRIAR HILL
- 3 ROTHERSTHORPE ROAD
- 4 ST LEONARD'S ROAD
- 5 GLOUCESTER CRESCENT
- 6 STEVENSON STREET
- 7 EAST HUNSBURY
- 8 THAMES ROAD
- 9 DOWNSWAY
- 10 BRACKMILLS
- 11 HARDINGSTONE
- 12 BREEZEHILL
- 13 WOODGATE ROAD
- 14 WOOTTON
- 15 WOOLDALE ROAD

# MAY 2018. NORTHAMPTON FLOOD INCIDENT INVESTIGATIONS



## **APPENDIX C**

### **Photographs**

Various photographs of the flood incident shared by residents.



Grangewood Park



Rowtree Road



Wall to rear of Swallow Close



Swallow Close



Property in Lichfield Drive



Property in Lichfield Drive





Lichfield Drive



Gardens to rear of Lichfield Drive



Penvale Park

## **APPENDIX D**

### **Photographs**

Various photographs of the flood incident area taken by the Investigating Officer



Culvert entry from Grangewood Park



Culvert exit (south of Swallow Close)



Wall to rear gardens of Swallow Close



Rowtree Road.



Penvale Park



Culvert entry from Penvale Park watercourse



Culvert exit (Hilldrop Road)

**APPENDIX E**

**Environment Agency Standard Notice**





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