

Nottingham City Council

Flood Investigation Report:

17th June 2020 Flood Event

**Bramcote Lane, Brookside Avenue
and Appledore Avenue,
Nottingham**

**Prepared under Section 19 of the Flood and
Water Management Act 2010**



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Nottingham
City Council

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FLOOD INVESTIGATION REPORT SUMMARY

Nottingham City Council is a Lead Local Flood Authority (LLFA) under the Flood and Water Management Act (2010) (FWMA).

Section 19 of the FWMA states that on becoming aware of a flood the LLFA must, where appropriate, investigate which Risk Management Authorities have relevant flood risk management functions and whether they have, or are proposing to, exercise those functions in response to the flood.

Flooding occurred at Bramcote Lane, Brookside Avenue and Appledore Avenue, Wollaton on 17th June 2020. It was considered necessary to undertake a formal investigation because Nottingham City Council's thresholds were surpassed, as more than 5 properties reported internal flooding. This Flood Investigation Report has been completed by the City Council under our duties as the LLFA and summarises the formal investigation that has been undertaken.

The flooding occurred as a result of an intense summer storm on the 17th June, resulting in a significant volume of rain falling onto the area of Wollaton. The storm was a significant event and overwhelmed local drainage infrastructure. This resulted in overland flows down Bramcote Lane, falling towards properties at low spots. The Risk Management Authorities with relevant flood risk management functions with regards to this flooding are therefore Severn Trent Water (Water and Sewerage Company), and Nottingham City Council (Highway Authority).

It is recommended that a Flood Risk Modelling study is undertaken to better understand the surface water flood risk in the area. The modelling can then be used to develop a potential flood risk management scheme and provide an evidence base for future funding opportunities.

1 INTRODUCTION

1.1 What is a Formal Flood Investigation?

Flooding has a devastating impact that affects people, property, business, the environment and transport. There are many different sources of flooding including rivers, sewers, surface water and groundwater and there are a number of Authorities and organisations involved in managing the risk of flooding from these different sources. Flooding can be caused by a complex interaction of different sources that can be difficult to resolve, particularly in urban areas.

Nottingham City Council is a Lead Local Flood Authority (LLFA) under the Flood and Water Management Act (2010) (FWMA). In recognition of the complex nature of flooding and the number of different Authorities that can be involved, Section 19 of the FWMA places a duty on LLFA's to investigate flooding in their area, as appropriate. The legislative requirements of Section 19 are included below.

Flood and Water Management Act (2010) – Section 19

- (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.

This report has been prepared in response to this legislative requirement.

1.2 Which Authorities are involved?

The Flood and Water Management Act (2010) identifies organisations that have flood risk management responsibilities as 'Risk Management Authorities'. Table 1 shows the key responsibilities of Risk Management Authorities that operate in the Nottingham City area.

Due to the number of different organisations involved, the City Council is responsible for the leading on flood investigations and works in partnership with relevant Risk Management Authorities. Through leading the investigation, the City Council will identify which Risk Management Authorities have flood risk management functions in relation to the flood event and what actions they propose to take, if any, to reduce flood risk in the future.

Risk Management Authority	Flood Risk Management Functions
Lead Local Flood Authority & Highway Authority: Nottingham City Council	<ul style="list-style-type: none">• River (fluvial) flooding from minor watercourses ('Ordinary Watercourses')• Surface water (pluvial) flooding• Groundwater flooding

	<ul style="list-style-type: none"> • Provision and maintenance of highway drains and road gullies
Water and Sewerage Company: Severn Trent Water	<ul style="list-style-type: none"> • Providing effectual drainage • Maintaining adopted public sewerage network
Environment Agency	<ul style="list-style-type: none"> • River (fluvial) flooding from large watercourses ('Main Rivers') • Flooding from the Sea and estuaries • Reservoir flooding

Table 1: Risk Management Authorities in Nottingham City Council's administrative area.

1.3 When are Formal Flood Investigations undertaken?

Nottingham City Council has developed thresholds and triggers for when a formal investigation will be undertaken following a flood event. These thresholds relevant to this Flood Investigation are shown below:

<p>Nottingham City Council Thresholds for Initiating Flood Investigations</p> <p>For a residential dwelling such as houses or flats, including Nottingham City Homes properties, a Section 19 flood investigation shall be carried out where:</p> <ul style="list-style-type: none"> • Internal (over the doorstep) flooding affects five or more properties and the properties are either in close proximity, or the flooding is hydraulically linked.

1.4 Flood Investigation Report

The flood event on the 17th June 2020 caused the internal flooding of 6 properties across Bramcote Lane, Brookside Avenue and Appledore Avenue.

Therefore, a Flood Investigation Report has been compiled because the number of properties that experienced internal flooding exceeds the thresholds that been set by the City Council.

2 SITE INFORMATION

2.1 Location of the flooding incident and the local area

Bramcote Lane, Brookside Avenue and Appledore Avenue are located approximately 5.5km south-west of Nottingham City centre, within the administrative district of Nottingham City Council (NCC), in the ward of Wollaton West. Wollaton is an urbanised residential area, with a significant area of open recreational and green space such as Wollaton Park and Martin's Pond (see Figure 1).

The nearest watercourse to the affected area is the Tottle Brook, approximately 450 metres away. The Tottle Brook originates from agricultural land (outside of Nottingham City Council's administrative area, to the west). From the source, it is classed as an ordinary watercourse and is mostly culverted from Bilborough Road (A6002). It becomes an open watercourse again to the rear of Fernwood Crescent, before becoming culverted and designated as main river for the remainder of its length until it reaches the River Leen, and eventually the River Trent.

Bramcote Lane is a steep road which originates as Thoresby Lane outside of the City boundary. Bramcote Lane falls towards the Tottle Brook "valley" along Wollaton Vale. Brookside Avenue and Appledore Avenue are both lower than Bramcote Lane, and also fall in the direction of the Tottle Brook.

Bramcote Lane, Brookside Avenue and Appledore Avenue are served by a separate foul and surface water sewer system. The surface water sewer runs under Bramcote Lane and across to Brookside Avenue, close to the affected properties, and eventually discharges into the Tottle Brook.



Figure 1: Site location

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2.2 Historical Flooding

Nottingham City Council do not hold any historic records of flooding affecting Bramcote Lane, Brookside Avenue or Appledore Avenue. However, it needs to be recognised that Nottingham City Council does not hold comprehensive records of historic flooding. Only those incidents of flooding over the past few years that have been reported to the Council's Traffic and Flood Management team have been recorded.

2.3 Predicted Flooding

The Environment Agency's Flood Map is a national dataset, which shows the areas in England and Wales predicted to flood from rivers and the sea, reservoirs and surface water. The dataset was made publicly available and is published on the Environment Agency's website⁽¹⁾.

The flood map indicates that Bramcote Lane, Brookside Avenue and Appledore Avenue are not at risk from river (fluvial) flooding.

The flood map for surface water indicates areas of High Risk across Bramcote Lane, Brookside Avenue and Appledore Avenue.

High Risk areas are where there is a chance that 1 in 30-year event flooding is likely to occur. Medium Risk areas are where there is a chance flooding will occur between 1 in 30 to 1 in 100-year event. Low Risk areas are where there is a chance of flooding for an event greater than 1 in 100-year.

High Risk areas are estimated to experience flooding of more than 900mm. Medium Risk of flooding are estimated to have sections of flooding with varying depths between 300mm and 900mm. Areas of Low Risk are estimated to have sections of flooding below 300mm.

An extract from the Environment Agency flood maps is included in **Appendix A**.

⁽¹⁾ <https://flood-warning-information.service.gov.uk/long-term-flood-risk>

3 FLOOD INVESTIGATION

3.1 Weather conditions before and during the event

Conditions in the days prior to the flood event on the 17th June were fairly dry with occasional showers, but there were no significant volumes of rainfall until the thunderstorm event, which started in the late afternoon. Due to the urbanised nature of the catchment, antecedent rainfall will not have contributed to this flood event.

Nottingham City Council own a network of 4 rain gauges across the city. The nearest rain gauge to the location of the storm that passed over the affected areas is at Clifton Leisure Centre, approximately 5.5 km south-east of Wollaton. The rain gauge recorded 33.6mm of rain over a 55 minute period.

The rain gauge also recorded 18mm of rainfall on the 18th June, however this was over a more prolonged period. Rainfall data has been summarised in the Figures 2 and 3 below.

Date	Total rainfall (mm) – Clifton Leisure Centre
15/06/2020	0.4
16/06/2020	1.8
17/06/2020	33.6
18/06/2020	18
19/06/2020	0.6

Figure 2: Recorded Rainfall at Clifton Leisure Centre

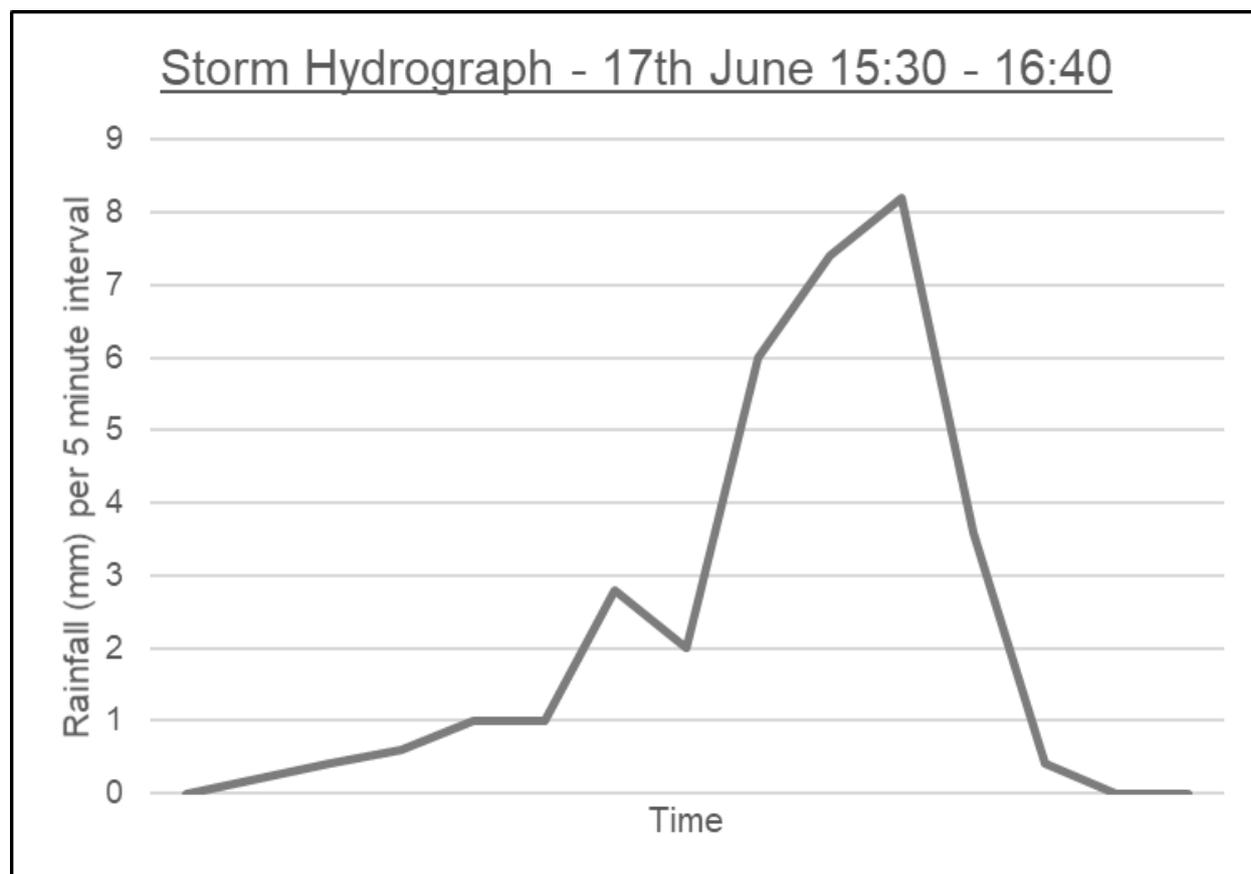


Figure 3: Storm Hydrograph for Recorded Rainfall at Clifton Leisure Centre – 17th June

An analysis of the flood records and rainfall radar data for the event has shown that the thunderstorm was extremely localised to the Wollaton and Clifton area. The storm moved across the City boundary from the south east over Clifton, and moved north west to Wollaton. Due to the localised nature of the storm, Nottingham City's rain gauges may not accurately reflect the volume of water that fell across this catchment. Further information has therefore been obtained through MapRain UK which utilises Met Office rainfall data. This data indicates an estimation of 52mm rain falling between 4.00pm and 6.30pm at Bramcote Lane.

The maximum return period for the rainfall at this location is estimated to be 1 in 70-year event. This highlights that there is a 1.43% chance of an event happening in a year.

The average precipitation for Nottingham in June is 56 mm ⁽²⁾. The date of the flooding incident indicates that almost an average month's rainfall fell over a period of 2 days in Wollaton. As such, the rainfall intensity was extremely high which would have compromised existing drainage systems to deal with the amount of rainfall.

⁽²⁾ <https://en.climate-data.org/europe/united-kingdom/england/nottingham-128/>

Whilst this is an extreme event, it must be clarified that this does not mean those affected will not flood again for 70 years, it means the chance of this event occurring in a single year is 1 in 70. This calculation utilises the maximum rainfall intensity recorded and may not represent the return period of the event for the whole of the catchment.

3.2 Flooding Source and Mechanism

The intense rainfall event resulted in a rapid inundation of water on the impermeable surfaces across the residential area, resulting in flooding occurring within 30 minutes of the storm. Due to the local topography and the fall of Bramcote Lane, overland flow routes were generated down Thoresby Lane and Bramcote Lane.

The overland flow breached the threshold of the Bramcote Lane carriageway, most likely where there are dropped curbs and ran along the frontages of properties on Bramcote Lane. This caused internal flooding of two properties, with others flooding externally. Brookside Avenue was affected both by the flow route coming from Bramcote Lane, and a route from affected properties on Bramcote Lane through rear gardens, causing flooding of four properties. Residual flows from Brookside Avenue reached Appledore Avenue, causing another property to be affected.

In addition to the local topography generating the significant overland flow route, flooding was exacerbated by local drainage infrastructure unable to withstand the volume of water. Sewers are typically designed to accommodate a 1 in 30 year event, meaning the capacity of the sewers would've been exceeded by the volume of rainfall that fell. This also means that road gullies which discharge into the surface water sewer would've "switched off" when the sewer was at capacity.

Once the storm had passed over the area, flood water quickly resided and local drainage infrastructure was able to freely drain again.

3.3 Preventative Measures

Nottingham City Council's Highway Services team has a gully cleansing regime to ensure all road gullies are cleared on an annual basis. In response to the flooding, the road gullies will be added to a 'Hotspot List' where increased cleansing will be undertaken in response to any weather warnings.

Nottingham City Council has a very limited supply of sandbags, which are reserved for protecting major infrastructure or for vulnerable residents who are unable to obtain their own. On this occasion, Highway Services were able to deploy some sandbags in time at Bramcote Lane.

There is currently not a flood warning system in place for this catchment.

Residents should look to invest in sandbags or more permanent flood defences as Nottingham City Council has limited supply and cannot guarantee deployment, particularly during intensity summer storms.

3.4 Flooding Impacts

The LLFA have investigated the impacts of flood event through a door knocking exercise with residents and collating reports which were received by the Risk Management Authorities in the area. The number of properties that reported to have flooded internally (across Bramcote Lane, Brookside Avenue and Appledore Avenue) was 6. At least 6 more properties were affected externally. This meant a number of residents were displaced as the properties were uninhabitable during repairs to damage. Damage varied between properties, but generally, there was unrepairable damage to furniture, furnishings, floorboards, carpets and items stored in garages. The impacts of the flooding were amplified for residents due to the ongoing COVID-19 pandemic.

3.5 Potential Solutions

Whilst flooding can never be fully mitigated (particularly for extreme events), there are possible measures that could be taken forward to increase community resilience and to reduce the severity associated with the impacts of flooding.

It is recommended that the LLFA works collaboratively with other Risk Management Authorities to develop a Flood Risk Model, looking at surface water risk and how the network and local infrastructure interact. This will improve understanding around the flood mechanisms and enable potential options to be tested and explored using the model as an evidence base. Modelling is an essential element to bid for funding to deliver any potential solutions.

To support the modelling, it is recommended that any data held by other Risk Management Authorities is shared with the LLFA.

Advice will be offered to residents on providing their own protection to improve their resilience, and how to build back smarter to reduce the impact of internal flooding.

Once a flood model has been built for the area, solutions such as Property Level Resilience measures (PLR) and sustainable drainage will be explored in order for the LLFA to support residents further should funding be available.

Road gullies in the area will be added to a more frequent cleansing regime known as the 'Hotspot List'.

4 RIGHTS AND RESPONSIBILITIES

Which Risk Management Authorities have flood risk management functions in relation to the flood event?

4.1 Lead Local Flood Authority (Nottingham City Council)

The FWMA places a number of responsibilities on LLFAs in relation to flood risk management. As stated in Section 1, LLFAs have a responsibility to investigate flood incidents, as appropriate, under Section 19 of the Act. Whilst we can investigate flood events, work with our professional partners and make recommendations for reducing the risk of future events, LLFAs do not have a responsibility or the funding to solve all flooding issues.

4.2 Highways Authority (Nottingham City Council)

NCC as the Highways Authority have a duty to maintain all highways classed as being "maintainable at public expense" that fall within their area of control. They have the lead responsibility for providing and managing highway drainage and roadside ditches under the Highways Act 1980. The owners of land adjoining a highway also have a common-law duty to maintain ditches to prevent them causing a nuisance to road users.

The Highways Authority are required to ensure that the drainage system is adequate and ensure they are maintained.

4.3 Public Sewer (Severn Trent Water)

Water companies are Risk Management Authorities (RMAs) and play a major role in managing flood and coastal erosion risks. They manage the risk of flooding to water supply and sewerage facilities and flood risks from the failure of their infrastructure.

The main roles of water and sewerage companies in managing flood and coastal erosion risks are to:

- Ensure their systems have the appropriate level of resilience to flooding and maintain essential services during emergencies.
- Maintain and manage their water supply and sewerage systems to manage the impact and reduce the risk of flooding and pollution to the environment. They have a duty under section 94 Water Industry Act 1991 to ensure that the area they serve is "effectually drained". This includes drainage of surface water from the land around buildings as well as provision of foul sewers.
- Provide advice to LLFAs on how water and sewerage company assets impact on local flood risk
- Work with developers, landowners and LLFAs to understand and manage risks – for example, by working to manage the amount of rainfall that enters sewerage systems.
- Work with the Environment Agency, LLFAs and district councils to coordinate the management of water supply and sewerage systems with other flood risk management work.

5 RECOMMENDATIONS FOR THE PUBLIC

Recommendations to the public:

- Where available, sign up to the EA's flood warnings (Floodline) by calling 0345 988 1188 or by registering online <https://www.gov.uk/sign-up-for-flood-warnings>.
- Where available, monitor online river gauge information as well as flood warnings <https://flood-warning-information.service.gov.uk/river-and-sea-levels>.
- Owners of affected properties should consider preparing a Household Emergency Plan and an emergency kit containing essential items.
- Implement resilience infrastructure inside of the property e.g. tiles instead of carpets, PVC doors instead of wood, water compatible walls, flooring and kitchen fittings, sump and pump systems, and raised electrics/meters.
- With support from Flood Risk Management Authorities, the community should make efforts to form a local resilience/flood group and communicate with their neighbours to help each other during an event. This should including appointing Community Flood Wardens and preparing a Community Emergency Plan.
- Seek support for insuring your property <https://www.floodre.co.uk/>
- Regularly inspect drainage systems in the area. Report blockages or other issues to the responsible owner and the LLFA.
- For further information, please see the Environment Agency's "What to do before, during and after a flood" document ⁽¹⁾.

(1) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/403213/LIT_5216.pdf

6 CONCLUSIONS & AGREED ACTIONS

A total of 6 residential properties were flooded internally across Bramcote Lane, Brookside Avenue and Appledore Avenue. A further 6 properties were affected externally. This was caused by a short high-intensity rainfall event occurring over 55 minutes on the 17th June, which generated an overland flow route which exceeded the capacity of drainage systems.

Severn Trent Water and Nottingham City Council are the Risk Management Authorities that have flood risk management functions in relation to the flood event. Severn Trent Water is responsible for managing and maintaining the public sewer network and Nottingham City Council is responsible for managing highway drainage and for investigating the flood event.

A number of recommendations have been made for residents to improve their resilience. Residents should report any future flooding issues associated with the Highway to Nottingham City Council. If flooding occurs and foul sewage is present or manholes visibly blow, this should be reported to Severn Trent Water.

Nottingham City Council as the Lead Local Flood Authority are working with other Risk Management Authorities to improve the understanding of the flood mechanism and will publish the flood risk modelling for the catchment. The flood risk model will also be used to test potential options to reduce flood risk and will provide an evidence base to support any funding opportunities.

6.1 Agreed Action Plan

There have been a number of actions undertaken in response to the flood event, as well as further actions planned.

Nottingham City Council (LLFA) Actions	Status
Obtain funding to build flood model of the catchment.	Complete.
Build flood model of the catchment to better understand and predict flood risk and test potential options to reduce flood risk across the catchment.	Ongoing.
Advise residents on resilience measures e.g. PLR, Sandbags and maintenance.	Ongoing.
Look for funding opportunities to assist residents on Property Level Resilience measures (PLR) or delivery of an alternative solution.	Ongoing.
Nottingham City Council (Highway Services) Actions	
Continue to maintain drainage infrastructure on the adopted highway and ensure they are clear for floodwater to drain away. Target cleansing of road gullies in receipt of weather warnings.	Ongoing maintenance. Gullies are to be placed on targeted 'Hotspot List'.
Severn Trent Water Actions	
Ensure sewer network is maintained and investigate network for any defects.	Ongoing maintenance.
Share asset data for flood modelling.	Ongoing.

7 DISCLAIMER

This report has been prepared by the Council solely for the purpose of complying with its duties under Section 19 of the Flood and Water Management Act 2010 to establish:-

1. Which risk management authorities have relevant flood risk management functions, and
2. Whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.

Nottingham City Council does not accept any liability arising from reliance on or the use of this report or its contents by any third party 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 should not be considered as a definitive statement of all factors that may have triggered or contributed to the flood event.

Nottingham City Council expressly disclaim responsibility for any error in, or omission from, this report and the supporting technical assessment Report and for any error in, or omission from, this report arising from or in connection with any opinion, conclusion and recommendations expressed.

Although the Council may have commented upon contextual issues related to the flood event, it is not the purpose of this report to determine any private rights arising from the flood event. Nor is the purpose of this report to reach conclusions as to whether any Risk Management Authority or other stakeholder (e.g. private land owners, public bodies or government agencies) has breached any duty of care (whether statutory or common law) that they may have held.

Any party wishing to assert any rights or cause of action related to the flooding event or in the process of buying/selling or insuring property should not place reliance on this report but should conduct and rely on their own investigations.

8 CONTACTS & USEFUL LINKS

Nottingham City Council Contacts & Links		
Nottingham City Council	0115 915 5555	https://www.nottinghamcity.gov.uk/reportit
Flood Risk Management Team	0115 876 5275 Monday to Friday 9:00-16:30	Advice on improving the level of protection to your property
Highway Services Team	0115 915 2000	https://myaccount.nottinghamcity.gov.uk/service/report-it-report-a-blocked-gully
Bulky Waste Collection	0115 915 5555	Free of charge bulky waste collection http://www.nottinghamcity.gov.uk/bulkywaste
Useful Web Pages	https://www.nottinghamcity.gov.uk/information-for-business/environmental-health-and-safer-housing/flooding/flood-document-library/	
Environment Agency Contact & Links		
Environment Agency	https://www.gov.uk/report-flood-cause	Reporting a flood
	0800 80 70 60	Environment Agency incident hotline (24 hours)
	0345 988 1188	Floodline
Severn Trent Water Contacts & Links		
Severn Trent Water	https://www.stwater.co.uk/in-my-area/report-a-problem/	Report a drainage problem (non-emergent)
	0800 783 4444	Emergencies (24 hours) e.g. leaking water main causing flooding

9 APPENDICES

Appendix A: Predicted Flood Risk Maps (Source: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/postcode>)



Extent of flooding from rivers or the sea

● High ● Medium ● Low ● Very low



Extent of flooding from surface water

● High ● Medium ● Low ○ Very low



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

- Over 900mm
- 300 to 900mm
- Below 300mm



Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

- Over 900mm
- 300 to 900mm
- Below 300mm



Surface water flood risk: water depth in a high risk scenario

Flood depth (millimetres)

- Over 900mm
- 300 to 900mm
- Below 300mm