

# Hertfordshire County Council Flood Investigation Report

Salisbury Avenue, St. Albans  
Hertfordshire



St. Albans, 2010  
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## Revision Schedule

### Hertfordshire County Council St. Albans Flood Investigation Report

August 2015  
Revision 3

<b>Rev</b>	<b>Date</b>	<b>Details</b>	<b>Author</b>	<b>Checked and Approved by</b>
<b>1</b>	30/07/15	For internal consultation	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
<b>2</b>	06/08/15	Text revision following comments from AH	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
<b>3</b>	06/08/15	Text revision following comments from Highways/Thames	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
<b>4</b>	13/10/15	Final amendments draft for circulation to affected residents.	Andy Hardstaff Flood Risk Management Team Leader HCC	John Rumble Head of Environmental Resource Planning HCC

## Explanation of Acronyms

Acronym	Explanation
<b>FWMA 2010</b>	<b>Flood and Water Management Act 2010</b> – Legislation that was developed and enacted as a result of the review in to the serious flooding in 2007. It brings new powers and duties to local authorities and other regulatory bodies.
<b>HCC</b>	<b>Hertfordshire County Council</b>
<b>LDA 1991</b>	<b>Land Drainage Act 1991</b> – Legislation that sets out a range of roles and responsibilities relating to flood risk management. It is also the legislation that gives powers to local authorities to manage flood risk and highlights the role of the landowner to manage watercourses on their land to maintain the flow of water.
<b>LLFA</b>	<b>Lead Local Flood Authority</b> – This is the role assigned to the unitary or county council for an area with a range of duties and powers to support the management of local flood risk.
<b>RMA</b> s	<b>Risk Management Authorities</b> – Bodies identified in the FWMA 2010 with roles and powers to manage flood risk. In Hertfordshire this includes the County Council, district councils, Highway Authority, the Environment Agency, the Bedfordshire and River Ivel Internal Drainage Board and water companies.

## Executive Summary

In St. Albans during July to September 2014, four intense rainfall flood events occurred, causing excessive surface water runoff. Three properties in Salisbury Avenue subsequently flooded externally, of which two also confirmed internal flooding. A number of other properties were also affected externally.

Due to the severity of the flooding and the number of properties impacted by this flood event, Hertfordshire County Council (HCC) as Lead Local Flood Authority (LLFA) have investigated the flood incident under Section 19 of the Flood and Water Management Act (FWMA) 2010 and published this report. The aim of this report is to establish the causes of the flooding; identify the relevant Risk Management Authorities (RMAs), highlight their role and responsibilities and confirm if those authorities intend to use their relevant powers to help manage the flood risk to St. Albans.

There is a history of flooding in this area, which appears to be an ongoing problem.

It has been concluded that the flooding was primarily a result of excessive surface water runoff from an urbanised catchment, which overwhelmed the drainage system. Intensity of the rainfall is significant; flooding is more likely to result from very heavy rain in a short period of time compared to a greater volume of heavy rain over a longer period of time.

As part of the Technical Assessment Report, produced by consultants appointed by HCC, a list of potential mitigation options that might help to manage flood risk to St. Albans was put forward. This report looks at the feasibility of each of these options, and which ones are included in our recommendations, along with the relevant RMAs that would need to be involved.

The main recommendations explored are:

- Survey and clean the highway drainage system;
- Detailed IAS and CCTV survey;
- Individual property level protection.

There is no one solution to resolve the flooding in St. Albans and there is no guarantee that flooding can be prevented. A collaborative approach will be required between all RMAs, landowners and the local community to manage flood risk in the future.



# 1. Introduction

## 1.1 LLFA Investigation

Under Section 19 of the Flood and Water Management Act (FWMA) 2010 Hertfordshire County Council (HCC) as Lead Local Flood Authority (LLFA), on becoming aware of a flood in its area, must, to the extent that it considers it necessary or appropriate:

- investigate the incident;
- identify the Risk Management Authorities (RMAs) with relevant flood risk management functions;
- establish if the relevant RMAs have responded to the flood event or are proposing to respond;
- publish its findings; and
- inform the relevant RMAs of its findings.

As defined under Section 6, subsection 13 of the FWMA 2010, an RMA has certain powers to manage, regulate, assess and mitigate flood risk. We have identified the following RMAs as part of this Section 19 flood investigation for St. Albans:

- HCC as LLFA
- HCC as Highway Authority
- St. Albans City & District Council

HCC received a report that several residential properties had suffered internal flooding in Salisbury Avenue, St. Albans.

Due to the severity of the flooding, it was determined that this flood incident met the criteria in Policy 2 of HCC's Local Flood Risk Management Strategy (<http://www.hertsdirect.org/services/envplan/water/floods/floodrisk/lfrmsHERTS/>) and HCC subsequently commissioned a detailed Investigation.

## 1.2 Technical assessment methodology

HCC commissioned NHTB Consultancy to carry out a technical assessment of the flooding events. Below is a summary of their methodology:

- Undertake detailed face-to-face surveys with occupants of all properties within the zone affected by flooding;
- Contact relevant drainage authorities;
- Undertake an initial topographical survey of the local site, flood path and flood zone, plus surrounding areas where any possible mitigation measures might be located;
- Assess drainage infrastructure;
- Obtain Ordnance Survey map data;
- Obtain rainfall data covering the flooding dates. Assess the flooding conditions and preceding conditions to identify the likely flooding mechanisms

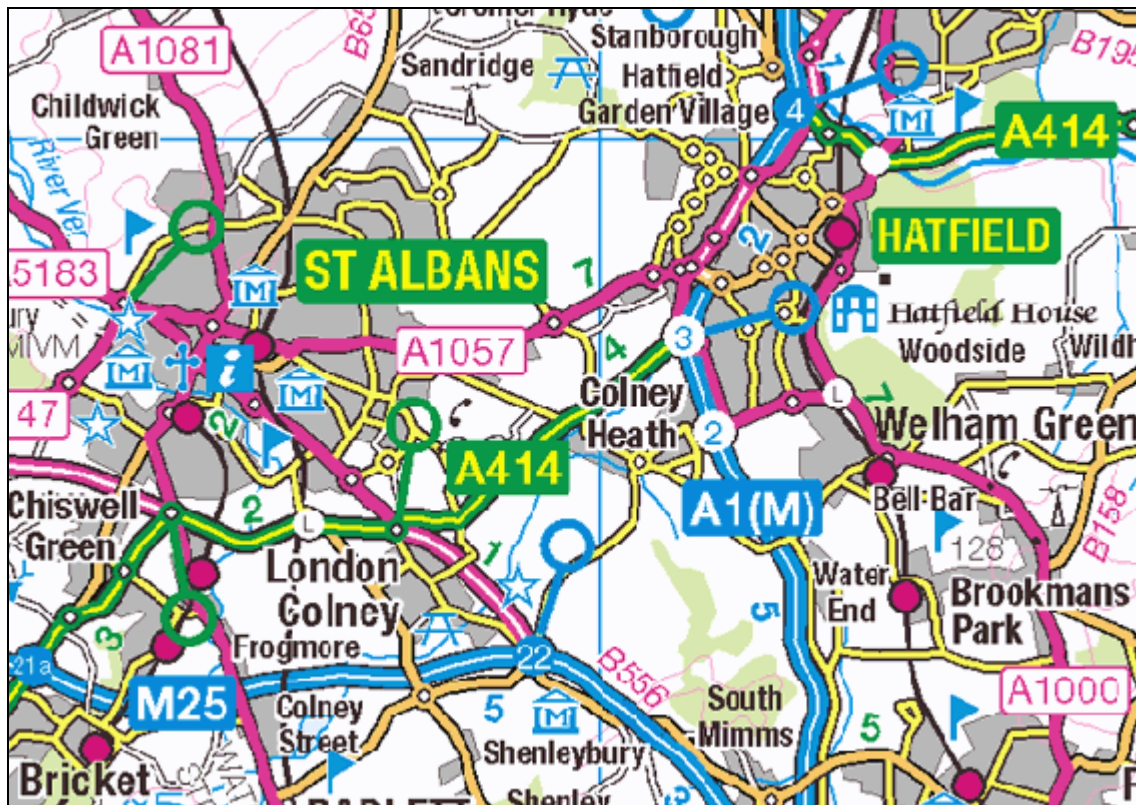
and conditions that lead to a flood. Confirm the flood paths and depths of flooding at strategic locations, including any barriers or constraints to flow;

- Identify potential further investigation work and outline potential mitigation works.

### 1.3 Site Location

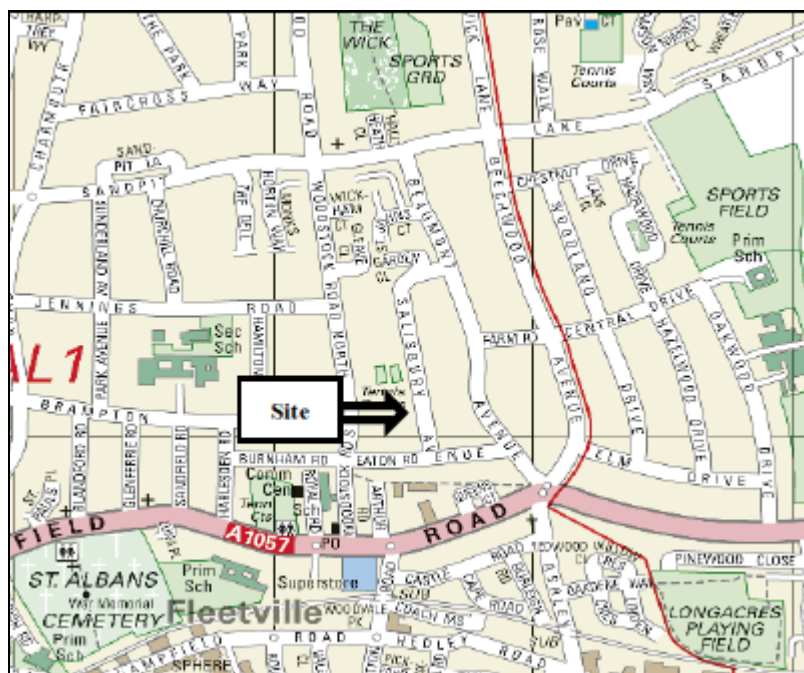
St. Albans is situated towards the south west of Hertfordshire, west of Hatfield. This is illustrated in Figure 1.1. The site affected by flooding is located in the eastern area of the town, in Salisbury Avenue, as shown in Figure 1.2.

**Figure 1.1 St. Albans, Hertfordshire – Location Map**



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**Figure 1.2 Area affected by flooding in St. Albans**



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## **2. Background and History of flooding**

### **2.1 Previous flood events**

Information gathered from residents provided some background on historical flooding in the area. Residents confirmed that surface water flooding is an ongoing problem which occurs every 4-5 years.

## **3. Assessment of July, August and September 2014 flood events**

### **3.1 Observations**

During the period of July to September 2014, this area of St Albans experienced flooding on four occasions. The flooding originates from a surcharging surface water sewer in Salisbury Avenue which spills over the path and into the affected properties. Figure 3.1 shows the flow route the water took, as it enters the rear gardens of Salisbury Avenue and floods the low point at Eaton Road.

The depression in Salisbury Avenue runs towards the T-junction of Salisbury Avenue and Eaton Road. The flooding in this area is a result of surface water surcharging at the lowest gully.



A total of 3 properties were flooded; 2 internally. A number of other properties were also affected externally.

**Figure 3.1 Overland flow paths**



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### **3.2 Ground conditions**

The flooding events were recorded following a period of dry ground conditions. However, as the catchment is almost completely impermeable it is not thought that preceding weather conditions would have had a significant impact on the flow characteristics. It is likely that any event would be of similar effect following dry or wet periods.

### 3.3 Sources of flooding

#### 3.3.1 Surface water runoff (pluvial)

The catchment that drains to the area which flooded measures approximately 4.22 ha. This is shown in Figure 3.2. The catchment drops relatively steeply from the junction at Salisbury Avenue at approximately 93.8m, to the low point of Eaton Road at approximately 90.8m, where the flooding ponds.

**Figure 3.2 Catchment boundary**



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#### 3.4 Surface Water Sewerage (Thames Water)

It is believed that the highway sewerage discharges into the adopted Thames Water sewer in Salisbury Avenue. The existing drainage infrastructure consists of a surface water sewer running the full length of Salisbury Avenue. Surface water from Garden Close and St John's Court to the north of the catchment also contributes to the sewer.

### **3.5 Possible causes of flooding**

The following are the key findings of the pluvial analysis and other flooding mechanisms that have been determined as part of this investigation:

- Excessive surface water runoff from an urbanised catchment
- A period of intense rainfall for each of the flooding events
- Highway drainage in Salisbury Avenue was overwhelmed and unable to cope with the volume of flood water.

## **4. Responsible authorities and landowners**

HCC as the LLFA has investigated the flooding at St. Albans to establish the relevant RMAs that have Flood Risk Management Functions in accordance with the FWMA 2010. Those RMAs and their relevant powers and functions are set out below.

### **4.1 Hertfordshire County Council as Lead Local Flood Authority**

HCC as the LLFA for Hertfordshire has fulfilled its legal responsibility to carry out a Flood Investigation under Section 19 of the FWMA 2010, to;

1. Identify the relevant RMAs and;
2. Establish if those authorities intend to utilise their own powers and to what extent. The actions that the relevant RMAs have agreed to take are set out in Section 6.

In order to achieve the responsibilities under Section 19, HCC as LLFA must first establish the cause and impacts of the flooding and then identify, where possible, potential solutions as discussed in this report.

HCC as the LLFA for Hertfordshire has powers to carry out flood risk management works for flooding from surface water runoff and ground water in accordance with the Local Flood Risk Management Strategy for Hertfordshire.

### **4.2 St. Albans City & District Council**

St. Albans City & District Council are the local planning authority for the St. Albans area and their role is to determine planning applications for new development, approve and assess any impacts from all sources of flooding and any associated proposed drainage.

### **4.3 Hertfordshire County Council as Highways Authority**

Salisbury Avenue and Eaton Road are adopted highways. HCC are the responsible authority to maintain and manage adopted highways including associated drainage infrastructure such as gullies, drainage pipes, soakaways and any assets that lie within the highway boundary.

HCC Highways have powers to manage water on an adopted road under the Highways Act 1981, however where this water originates from third party land and not from runoff from the highway these powers are limited.

#### **4.4 Thames Water**

Thames Water is responsible for the surface water sewerage drainage system in the affected area, which drains the highway drainage catchment.

#### **4.5 Landowners**

It is assumed that the surface water drainage for individual properties either drains to permeable surfaces or soakaways and does not contribute to runoff on the highway or surface water sewer.

### **5. Conclusions, potential mitigation options and recommendations**

#### **5.1 Conclusions**

The flooding events were the result of excessive surface water runoff from an urbanised catchment. The surface water runoff resulted from intense rainfall events.

The highway drainage system would have had a limited capacity in reducing the flood flows.

In order to manage the flood risk in the area, there needs to be a collaborative approach between the LLFA, relevant landowners and all of the identified relevant RMAs.

#### **5.2 Potential mitigation options**

NHTB Consultancy produced several mitigation options in their technical assessment report, looking at potential costs, benefits and constraints of each one. They are shown below, along with an assessment by HCC as to their feasibility and whether they are included in our recommendations going forward.

It is also recommended that the entire system is cleaned using high pressure jetting, and a CCTV survey conducted to establish any serious structural defects that may also be inhibiting optimum hydraulic performance.

<b>5.2.1 Install measures for surface water collection</b>
There is suitable scope to install a soakaway within the grassy area of Garden Close. Reducing the volume of water entering the surface water system may reduce the risk of the sewer surcharging. This would significantly reduce the catchment size and create a sustainable drainage solution. Further modelling would be required to determine the size and performance of the soakaway.

<b>Advantages:</b> Reduction of volume entering the surface water system.
<b>Issues:</b> Increased maintenance liability, may only be effective for low return events.
<b>Budget cost estimate:</b> £10,000 - £20,000
<b>Include in Recommendations?</b> No. It would be overwhelmed very quickly in storm conditions. Although it has been identified by the consultants as an engineering option any further consideration would need to be informed by the work at 5.2.2.

<b>5.2.2 A detailed IAS and CCTV connectivity survey.</b>
A CCTV connectivity survey would determine if the estate connects to Salisbury Avenue. An Impermeable Area Survey (IAS) would increase understanding of the volume of water entering the sewer within the catchment area. Data regarding the sewer in Salisbury Avenue and in particular the surface water network at Garden Close and St John's Court would give an understanding of the exact volume of water which is entering the system during storm events. This data would aid the modelling process and further justify mitigation methods.
<b>Advantages:</b> Data can be used to further model the catchment and justify mitigation.
<b>Issues:</b> The sewer has been surveyed in the past however it is not clear where exactly. Needs agreement from both HCC Highways and Thames Water..
<b>Budget cost estimate:</b> £4000- £5500 (to be confirmed)
<b>Include in Recommendations?</b> Yes. HCC as Highway Authority will complete a CCTV and jetting of the highway gullies and connecting pipe work back to the surface water sewer. Needs to be coordinated with a recommendation that Thames Water survey and CCTV their surface water sewers that carry the water away from the roads back to an appropriate section of their network. This work should then feed into an assessment of overall network capacity

<b>5.2.3 Installation of a flood storage area</b>
There is suitable scope to improve the surface water collection within Garden Close and St John's Court. The road leading to the garages at Garden Close would be a suitable location for a flood storage area to slow down and contain the water and reduce the amount entering the main line at Salisbury Avenue. The consultants recommend that an overflow soakaway be installed within the grassy area parallel to the alleyway to accommodate for an extra flow.
<b>Advantages:</b> Improved collection and disposal of surface water from the natural flow path.
<b>Issues:</b> Increased maintenance liability. May not have enough capacity to avoid potential flooding. Dependant on work at 5.2.2 being completed.
<b>Budget cost estimate:</b> £20,000 - £30,000
<b>Include in Recommendations?</b> Not recommended at this point as the benefit obtained is uncertain and needs to be proportionate to the cost of the scheme. Although it has been identified by the consultants as an engineering option any further consideration would need to be informed by the work at 5.2.2.



#### 5.2.4 Improvement to Highway Drainage – Further Modelling

There is suitable scope to improve the surface water collection within Garden Close and St John's Court. It is recommended to model the existing highway system and gully arrangement to determine the actual capacity; i.e. whether the gullies' location and number are preventing optimum conveyance to the drainage network, or if they are adequate and simply require improved maintenance. Model future storm events to enable predicted flood damage and benefit/cost analyses for higher order rainfall events, to assist in the production of the most cost effective measures to prepare as a suitable solution.

**Advantages:** Improved collection and disposal of surface water from the natural flow path.

**Issues:** Increased maintenance liability. May not have enough capacity to avoid potential flooding. Dependant on work at 5.2.2 being completed.

**Budget cost estimate:** £20,000 - £30,000

**Include in Recommendations?** Not recommended at this point as the benefit obtained is uncertain and needs to be proportionate to the cost of the scheme. Although it has been identified by the consultants as an engineering option any further consideration would need to be informed by the work at 5.2.2.

#### 5.2.5 Flood Protection Measures to Individual Properties

Emergency protection measures are recommended to be fitted to each of the flood entry points at the properties that have been subject to flooding on Salisbury Avenue. Ideally these should be automated devices that are activated by the presence of approaching flood water, or a flood resilient door itself. Alternatively they can be fittings that require installation by the residents in advance of anticipated severe storm conditions.

**Advantages:** Protection against internal flooding.

**Issues:** Requires consent from local landowners, owners intervention required to install non-automatic flood barriers and no protection against external flooding.

**Budget cost estimate:** £5,000 - £15,000

**Include in Recommendations?** Yes, level of protection easily understood. Installation and maintenance in property owners control. Can be installed on short timescale at proportionate cost.

### 5.3 Recommendations

The following are the recommendations of the county council, in its capacity as LLFA and follow from the main findings from the Section 19 flood investigation carried out into the flood events in St. Albans during the period July to September 2014.

No.	Recommendations	Comments	RMA's and other parties to be involved
1.	Survey and clean highway drainage system (Option 5.2.2.)	That the highway drainage system in Salisbury Avenue and Eaton Road be surveyed using CCTV to establish any serious structural defects which may be affecting performance. That any identified blockages be removed to ensure that the system is free of debris and silt.	<ul style="list-style-type: none"><li>•</li><li>• HCC – Highways Authority</li></ul>
2.	Detailed IAS and CCTV survey (Option 5.2.2.)	Undertake an Impermeable Area Survey and CCTV connectivity survey to understand the volume of water entering the sewer within the catchment area.	<ul style="list-style-type: none"><li>• HCC - LLFA</li><li>• HCC – Highways Authority</li><li>• Thames Water</li></ul>
3.	Investigation of Property level protection (Option 5.2.5.)	That individual properties have flood risk assessments with a view to retro-fitting protection to properties to increase resilience to flooding. This is for individual property owners to organise and fund.	<ul style="list-style-type: none"><li>• Property owner</li><li>• HCC – LLFA</li></ul>

## **6. Next Steps and Actions**

### **6.1 Lead Local Flood Authority**

The following are agreed actions to be undertaken by HCC in its capacity as LLFA;

1. To work with HCC as Highway Authority and Thames Water to carry out a detailed IAS and CCTV survey (recommendation 2).
2. To signpost residents to further guidance on property level flood protection. The National Flood Forum is best placed to assist: (recommendation 3)  
<http://www.nationalfloodforum.org.uk/>

### **6.2 Highway Authority**

The following are suggested actions to be undertaken by HCC in its capacity as Highways Authority;

3. To survey and clean the highway drainage system in Salisbury Avenue and Eaton Road (recommendation 1).
4. To support and contribute as appropriate to the IAS and CCTV survey (recommendation 2).

### **6.3 Thames Water**

The following are suggested actions to be undertaken by Thames Water;

5. To support and contribute as appropriate to the IAS and CCTV survey (recommendation 2).

## **7. Disclaimer**

This report has been prepared as part of Hertfordshire 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. NHTB Consultancy and Hertfordshire County Council expressly disclaim responsibility for any error in, or omission from, this report and the supporting technical assessment Report arising from or in connection with any of the assumptions being incorrect.

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