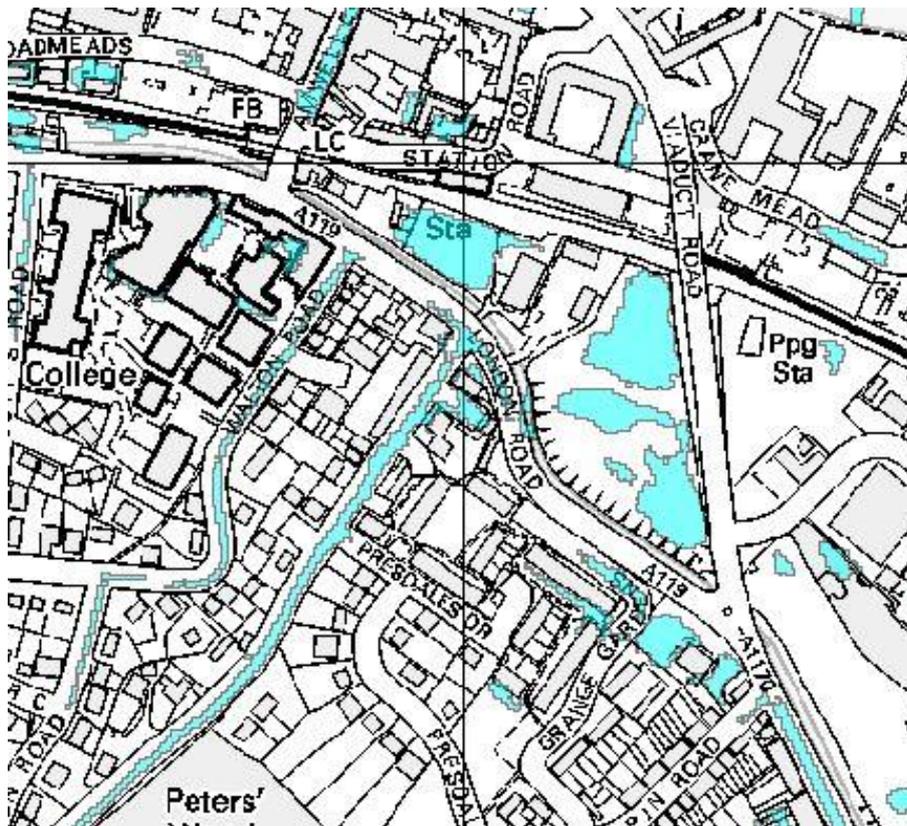


Hertfordshire County Council Flood Investigation Report

London Road, Ware
Hertfordshire



Extract from national Updated Flood Map for Surface Water
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Revision Schedule

Hertfordshire County Council Ware Flood Investigation Report

April 2016
Revision 4

Rev	Date	Details	Author	Checked and Approved by
1	31/07/15	For internal consultation	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
2	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
3	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
4	21/04/16	Final amendments	Andy Hardstaff Flood Risk Management Team Leader HCC	John Rumble Head of Environmental Resource Planning HCC

Explanation of Acronyms

Acronym	Explanation
FWMA 2010	Flood and Water Management Act 2010 – 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.
HCC	Hertfordshire County Council
LDA 1991	Land Drainage Act 1991 – 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.
LLFA	Lead Local Flood Authority – 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.
RMAs	Risk Management Authorities – 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 Ware on 13 October 2014, a period of low intensity rainfall falling over a period of approximately nine hours, led to excessive surface water runoff. Four properties in London Road (one commercial and three residential) subsequently flooded both internally and 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 Ware.

There is a long history of flooding in this area. Residents recalled flooding on numerous occasions prior to 2014.

It has been concluded that the flooding was primarily a result of excessive surface water runoff from a saturated catchment. Rainfall over a number of days caused saturated ground conditions resulting in the permeable areas of the catchment effectively acting as impermeable, which led to levels of run off which overwhelmed the local drainage systems.

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 Ware 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;
- Individual property level protection;

There is no one solution to resolve the flooding and there is no guarantee that flooding can be prevented. A collaborative approach will be required between 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 Ware:

- HCC as LLFA
- HCC as Highway Authority
- East Hertfordshire District Council

HCC received a report that a commercial property and several residential properties had suffered internal flooding in London Road, Ware.

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 event. 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;
- Seek details of flood damages and depth of flooding, including any insurance claims, from those affected;
- Undertake a detailed topographical survey of the contributory catchment, flood path and flood zone, plus surrounding areas where any possible mitigation measures might be located;
- Obtain Ordnance Survey map data;

- Obtain rainfall data covering the flooding dates and conduct hydraulic assessments to replicate runoff conditions;
- Assess the flooding conditions under different storm and preceding conditions to identify the 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 mitigation works and measure the effectiveness of each;
- Make an assessment of the relative damage costs and cost of mitigation works for each option and make comparisons of the benefits and constraints of each option.

1.3 Site Location

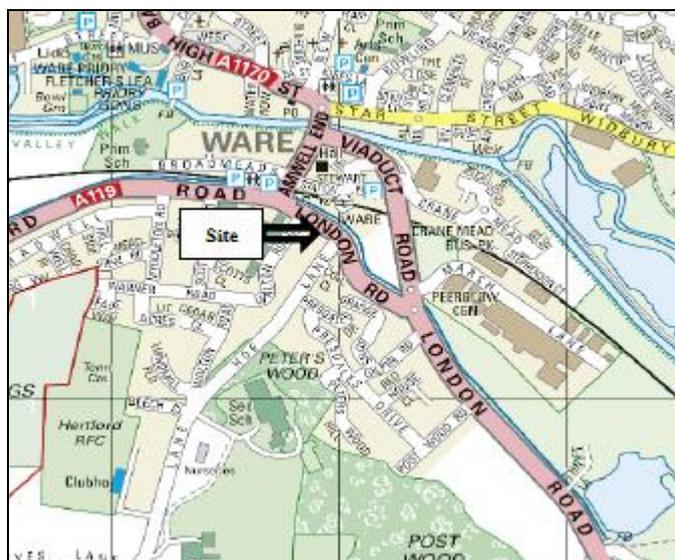
Ware is located in the east of Hertfordshire, north east of Hertford shown below in Figure 1.1. The site where this investigation was carried out is located in the south of the town, at the junction of London Road and Hoe Lane, as shown in Figure 1.2.

Figure 1.1 Ware, Hertfordshire – Location Map



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Figure 1.2 Area of investigation in Ware



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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 were aware of flooding from surface water runoff prior to 2014, on a number of occasions. The area is also recognised in East Hertfordshire District Council's Strategic Flood Risk Assessment (SFRA) as a flood risk area.

3. Assessment of 13 October 2014 flood events

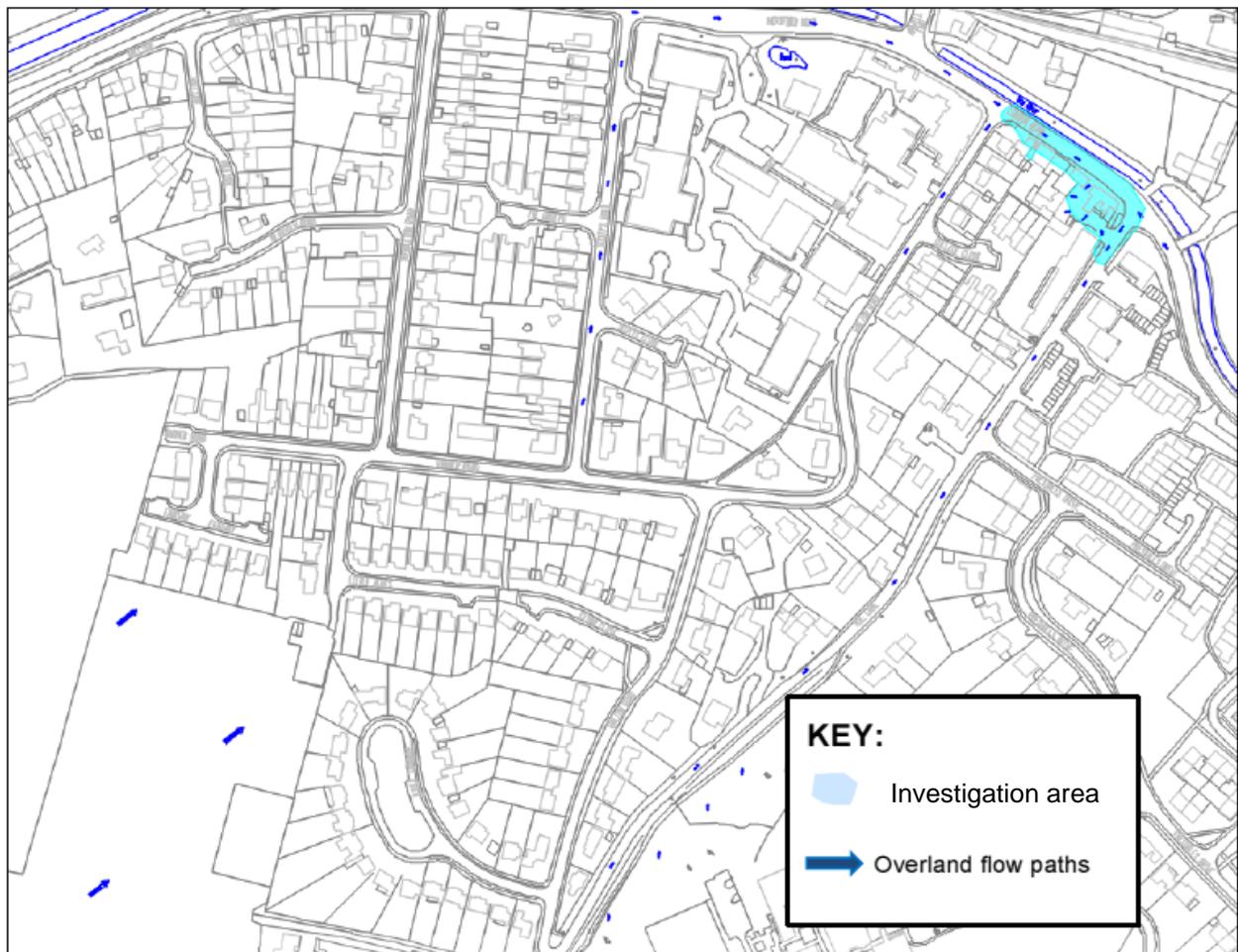
3.1 Observations

On 13 October 2014 flow of surface water runoff started at the top of Hoe Lane running towards the T-junction of London Road where it pooled and flooded a commercial property and three residential properties. Walton Road also falls towards London Road, contributing to the runoff.

The properties affected are located in a natural depression in the vicinity of Hoe Lane and London Road. The source of the flooding is believed to originate from higher ground starting in the vicinity of the playing fields at the southern end of Hoe Lane.

A total of four properties were flooded; all both internally and externally. Figure 3.1 shows the flow route of the water.

Figure 3.1 Overland flow paths



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3.2 Ground conditions

The flooding event was recorded following a period of saturated ground conditions. The catchment can be described as 30% permeable (due to the playing fields) and 70% impermeable from the remaining urban area. When saturated, however, the whole catchment would effectively be impermeable and therefore representative of a 100% urbanised catchment.

3.3 Sources of flooding

3.3.1 Surface water runoff (pluvial)

The catchment that drains to the area which flooded measures approximately 24.57 ha. This is shown in Figure 3.2. The catchment generally lies at approximately 68.7m at its highest point, draining down to London Road at an approximate level of 33.6m, a fall of approximately 35m over 1km.

Figure 3.2 Catchment boundary



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3.4 Surface Water Sewerage (Thames Water)

There are no surface water or foul sewers which contribute to the runoff from the catchment.

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 a saturated catchment, resulting in the permeable area effectively acting as impermeable

- Low intensity rainfall event over a long period of approximately nine hours; the long storm duration likely generated a lot of silt and debris with the runoff, as well as large surface water volumes, causing localised flooding despite the low intensity rainfall
- Highway drainage in London Road and Hoe Lane was overwhelmed by the volume of flood water.

4. Responsible authorities and landowners

HCC as the LLFA has investigated the flooding at London Road Ware 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 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, where possible, identify actions to reduce flood risk.

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

4.2 East Hertfordshire District Council

East Hertfordshire District Council are the local planning authority for the Ware 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

London Road, Hoe Lane and Walton 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 falling 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.

5. Conclusions, potential mitigation options and recommendations

5.1 Conclusions

The flooding was the result of excessive surface water runoff from a saturated catchment. A significant proportion of the catchment (30%) which is classified as a permeable area would have been acting as though it was impermeable resulting in higher levels of runoff. The surface water runoff which caused the flooding resulted from a low intensity rainfall event over a period of approximately nine hours, generating silt and debris as well as large surface water volumes.

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

In order to develop and provide a suitable resolution to the flooding, 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 considered several mitigation options in their technical assessment report, looking at potential benefits and constraints and estimating costs, of each one. They are shown below, along with an assessment by HCC as to their feasibility and whether they can be included in the recommendations.

5.2.1 Improvement to Highway Drainage – Surface Water Collection
There is suitable scope to improve the surface water collection and disposal capacity for run off into London Road. The highway drainage system in Hoe Lane, Walton Road and London Road should 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.
Advantages: Improved collection and disposal of surface water from the natural flow path.
Issues: Increased maintenance liability
Budget cost estimate: £2,000 - £3,000 (Survey costs)
Include in Recommendations? Yes

5.2.2 Improvement to Highway Drainage – Surface Water Sewer

Installing gullies at the southern end, in the upper catchment, in Hoe Lane and possibly soakaways, would likely help reduce the amount of surface water runoff being drained initially into London Road. There are very few gullies in the upper catchment, although according to Thames Water records there appear to be soakaways in the carriageway – however, these would be expected to be Highways authority controlled if they are present. Establish presence of soakaways.

Advantages: Reduce initial runoff for lower order events, reducing likelihood of frequent flooding in London Road.

Issues: Increased maintenance liability, excavation of Hoe Lane required and difficult due to narrow width and lack of diversion routes.

Budget cost estimate: £30,000-£50,000

Include in Recommendations? Soakaway investigation should be included in IWP survey. Will not put forward additional gullies by HCC as unlikely to make a significant impact in storm events. Would also be prioritised against other potential schemes and unlikely to succeed due to high cost relative to benefits realised.

5.2.3 Flood Protection Measures to prevent flooding to rear of public house

Raising the kerb at the bottom of Hoe Lane would help contain the surface water runoff during a lower order storm event. Combining this with raising the public house car park entrance threshold would reduce the risk of the basement flooding.

Advantages: Protection against internal flooding.

Issues: May increase, slightly, the flood levels on London Road by removing “flood storage” of car park. May increase risk of flooding through front door.

Budget cost estimate: £15,000

Include in Recommendations? No. Raising the kerb would provide little protection in storm conditions as the storage capacity would be negligible; it may also create secondary problems as the footway would be failing back towards the property.

5.2.4 Flood Protection Measures to Individual Properties

The public house is Grade II listed so cannot undergo external remedial works to prevent flooding. The properties in London Road can, however benefit from individual property measures, such as door guards, flood doors and air brick covers.

Advantages: Cost effective way to reducing surface water runoff.

Issues: Requires consent from local landowners. Does not benefit public house as a listed building.

Budget cost estimate: £0-£6,000 per property (three current properties)

Include in Recommendations? Yes. Enables owners to directly manage flood risk affecting property. Provides known level of protection across a range of storm conditions.

5.2.5 Flood Protection Measures to store flood flows above/below ground

The playing fields were already saturated from rainfall of the previous day of the October storm event, suggesting that the majority of water which landed within the playing fields was unable to drain and contributed to the surface water runoff, carried by the steep incline of Hoe Lane. Installing a soakaway/storage feature within the playing fields at an appropriate location would reduce the volume of water entering the surface water sewer at Hoe Lane, reducing the risk of the gullies being blocked with silt runoff and/ or surcharging due to over capacity.

Advantages: Cost effective way to reducing surface water runoff and flooding.

Issues: Requires consent from local landowners. Viability dependent on space available and consequently storage available for given return periods.

Budget cost estimate: £50,000-£60,000 plus land fees and maintenance.

Include in Recommendations? Will not be put forward by HCC due to unviable cost benefit (is less than 0.2 and needs to be greater than 1) and uncertainty of contribution to flood risk reduction.

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 event in Ware on 13 October 2014.

No.	Recommendations	Comments	RMAs and other parties to be involved
1.	Survey and clean highway drainage system	That the highway drainage system in London Road, and Hoe Lane is 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.	• HCC – Highways Authority
2.	Investigation of property level protection	That individual property have flood risk assessments with a view to retro-fitting protection to increase resilience to flooding. This would be for individual property owners to organise and fund. (may not be suitable for the commercial property as is Grade II listed.)	• Property owner

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. Provide information in this report to further guidance on property level flood protection.

The National Flood Forum is best placed to assist:

<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;

2. Consider the area for inclusion on the Integrated Works Programme to survey and clean the highway drainage system in London Road and Hoe Lane.

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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