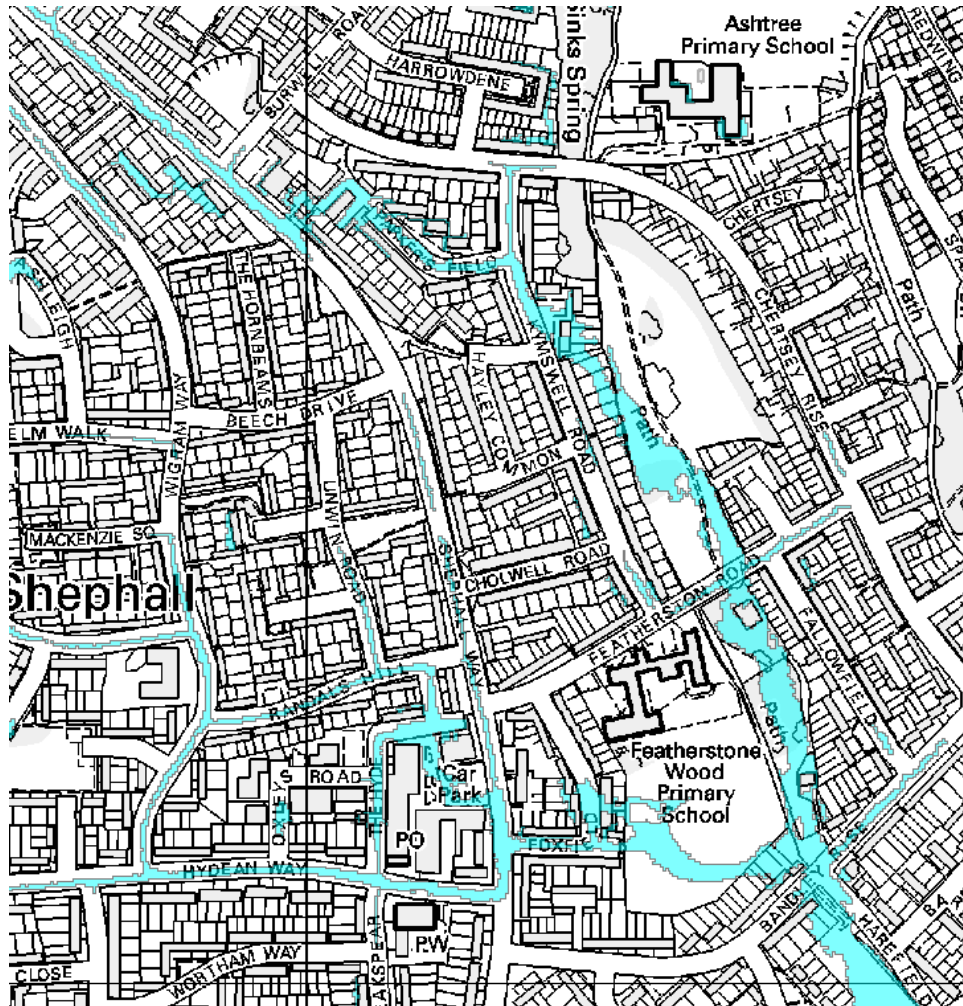


Hertfordshire County Council Flood Investigation Report

Kymswell Road Stevenage, Hertfordshire



Extract from national Updated Flood Map for Surface Water
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Revision Schedule

Hertfordshire County Council Stevenage Flood Investigation Report

August 2015

Revision 4

Rev	Date	Details	Author	Checked and Approved by
1	23/07/15	For internal consultation	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
2	28/07/15	Text revision following comments from AH/LL	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
3	05/08/15	Further text revision following comments from AH	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
4	06/08/15	Text revision following comments from Highways/Thames Water	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
5	04/05/16	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 Stevenage on 19 September 2014, a period of intense, heavy rainfall fell over a period of approximately one hour, causing excessive surface water runoff. Four properties in Kymswell Road subsequently flooded externally, of which two also confirmed internal flooding.

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 Stevenage.

There is some history of flooding in this area dating back to 2002.

It has been concluded that the flooding was primarily a result of excessive surface water runoff from an urbanised catchment, which overwhelmed the available drainage.

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 Stevenage was put forward. This report sets out the feasibility of each of these options and indicates which ones should be included in the recommendations, along with the relevant RMAs that would need to be involved.

The main recommendations explored are:

- Survey and clean the highway drainage system;
- Inspect, clean and maintain gullies;
- Individual property level protection.

The area was affected by further flooding on 16/17 July 2015. This event was not included in the technical assessment. It was an extreme event analogous to the modelled event depicted on the front cover. A high energy storm tracked eastwards across Hertfordshire caused in excess of 60mm (2½ inches) of rain to fall in two and a half hours. It will not be investigated further as it is reasonable to assume that the flooding mechanism was similar to the 19 September 2014 flood event.

There is no one solution to resolve the flooding in Stevenage and there is no guarantee that flooding can be prevented. A collaborative approach will be required between all RMAs, 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 potentially relevant to this Section 19 flood investigation for Stevenage:

- HCC as LLFA
- HCC as Highway Authority
- Thames Water

HCC received a report from Stevenage Borough Council that several residential properties had suffered internal flooding in Kymswell Road, Stevenage.

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/lfrmshearts/>) and HCC has subsequently carried out 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:

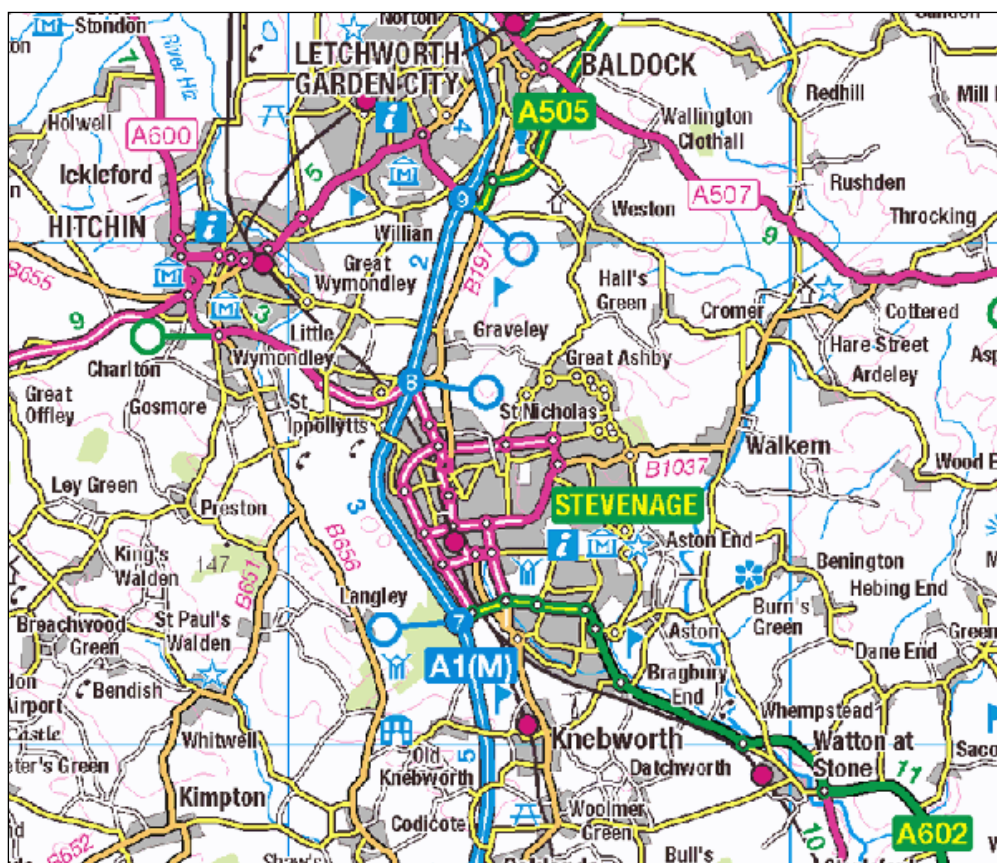
- Undertake detailed face-to-face surveys with occupants of all properties within the zone affected by flooding;
- Contact relevant drainage authorities;
- Seek details of flood damages and depth of flooding, including any insurance claims, from those affected;
- Undertake a detailed topographical survey 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

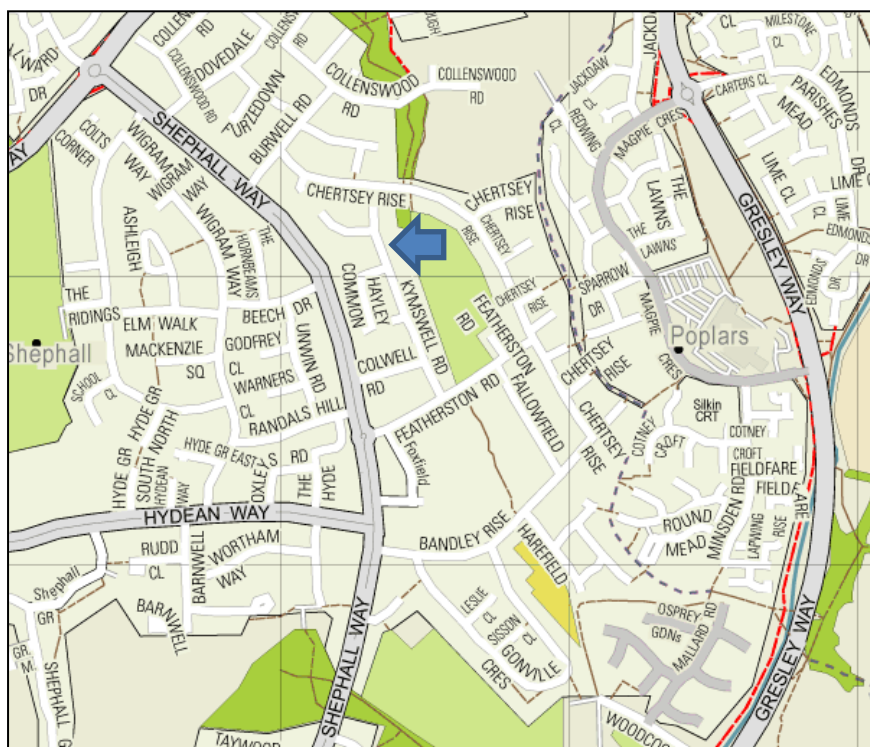
Stevenage is situated towards the north of Hertfordshire, south east of Hitchin. This is illustrated in Figure 1.1. The site affected by flooding is located in the south east of the town, in Kymswell Road, as shown in Figure 1.2.

Figure 1.1 Stevenage, Hertfordshire – Location Map



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Figure 1.2 Area of investigation in Stevenage



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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. One resident was aware of two previous flood events dating back to 2002. Another stated that they flood externally from surface water every few years.

3. Assessment of 19 September 2014 flood event

3.1 Observations

On 19 September 2014, flooding occurred at the middle part of Kymswell Road and its junction with Hayley Common which leads onto Shephall Way. Surface runoff gathered and flowed down both Hayley Common and Kymswell Road, flooding four residences.

The flooded area sits within a natural valley. The sides are relatively steep, and are generally the steepest towards the top of both Kymswell Road and Hayley Common, both draining to a hollow situated in a lay-by.

A total of 4 properties were flooded; 2 internally. Figure 3.1 shows the flow route the water took.

Figure 3.1 Overland flow paths



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3.2 Ground conditions

The flooding event was recorded following a period of dry ground conditions. However, as the majority of the catchment is 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 1.16

ha. This is shown in Figure 3.2. The catchment drops relatively steeply from its high point at the top of Kymswell Road, at the junction with Chertsey Rise, at approximately 95.8m, down to approximately 90.7m at the layby area in Kymswell Road, where the water ponds.

Figure 3.2 Catchment boundary



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3.4 Surface Water Sewerage (Thames Water)

Thames Water is responsible for the system. There are no soakaways listed on sewer plans; however, there are many gullies located in the footpath at the foot of the terraced properties. The consultants were unable to trace where these gullies drain to however, but the pipe seemed to be draining to the grassy area next to the properties.

The surface water sewer forms the whole drainage system within the catchment, and eventually drains down into Aston End Brook just south of Stevenage.

The system that is located adjacent to the affected properties begins on Hayley

Common with a 150mm diameter pipe which joins with a 225mm diameter pipe; this pipe eventually joins with the main sewer running down Kymswell Road.

There are a few gullies in the carriageway of Kymswell Road and Hayley Common, as well as the layby in Kymswell Road; the survey picked up some, but not all locations, where possible and where GPS signal permitted. At the time of the survey the majority of the gullies were full of silt build up; this was especially the case for Hayley Common where debris from the grassy area drained into the gullies.

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:

- Intense rainfall event over a period of approximately one hour
- Excessive surface water runoff from an urbanised catchment
- The volume of flood water exceeded the design capacity of the highway drainage in Hayley Common and Kymswell Road.

4. Responsible authorities and landowners

HCC as the LLFA has investigated the flooding at Stevenage 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 Stevenage Borough Council

Stevenage Borough Council is the local planning authority for the Stevenage 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

Kymswell Road and Hayley Common 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.

5. Conclusions, potential mitigation options and recommendations

5.1 Conclusions

The flooding was the result of excessive surface water runoff from an urbanised catchment. The surface water runoff resulted from an intense rainfall event over a period of approximately one hour.

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 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, for both Kymswell Road and Hayley Common.

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 down Kymswell Road and Hayley Common. The consultants recommend that gullies should be inspected, cleaned and maintained to ensure maximum efficiency.

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

Issues: Increased maintenance liability, may only be effective for low return events.

Budget cost estimate: £3,000 - £5,000

These measures would be the responsibility of HCC for the highway gullies and carrier drains and Thames Water who are responsible for the surface water sewers which the highway drains link into.

Include in Recommendations? Yes put area forward for inclusion on Integrated Works Programme.

5.2.2 Improvement to Highway Drainage – Further Modelling

There is suitable scope to improve the surface water collection and disposal capacity for run off down Walton Road.

Model the existing highway system and gully arrangement on Shephall Way 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, if the sewer is of a necessary size.

Model future storm events including the flows on Shephall Way and possible pooling to see whether it directly affects the flows down Hayley Common and subsequently Kymswell Road.

Further investigate the gully arrangement within the layby of Kymswell Road and down Hayley Common to see whether the gullies' location and number are preventing optimum conveyance to the drainage network.

Advantages: Will be able to accurately determine the correct number of gullies and sizes needed to convey the flow of a higher order storm event.

Will be able to accurately determine whether the possible flooding on Shephall Way directly influences/affects the flooding that occurs on Kymswell Road.

Issues: Cost, may only prove there are minimal issues.

Budget cost estimate: £3,000 - £6,000

Include in Recommendations? Put area forward as a "hotspot" for inclusion in the Surface Water Management assessment for Stevenage with improved modelling of the flood flows as the current surface water flood map does not match what has been observed.

5.2.3 Flood Protection Measures to Individual Properties

Flood protection measures are recommended to be fitted to each of the flood entry points at the properties that have been subject to flooding on Kymswell Road. Ideally these should be full uPVC, or similar, flood doors or automated devices that are activated by the presence of approaching flood water; 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: £0-£6,000 per property for owners

Include in Recommendations? Yes

5.2.4 Flood Protection Measures to store flood flows above ground

Raising kerbs along the lay-by will help contain the surface water flooding within the road. Also raising the kerb of the drive way at the affected property will help contain the water flowing directly from Hayley Common.

Advantages: Cost effective way of retaining surface water run-off.

Issues: Raising the kerbs will help contain the water; however it is not a solution to the existing surface water runoff.

Budget cost estimate: £15,000

Include in Recommendations? Not recommended by HCC at this stage as it does not solve the flooding problem – flood water may only be contained temporarily and possibly cause more issues if the kerbs were overtopped at a higher level.

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 Stevenage on 19 September 2014.

No.	Recommendations	Comments	RMAs and other parties to be involved
1.	Inspect, clean and maintain gullies	The gullies should be inspected, cleaned and maintained to ensure maximum efficiency	<ul style="list-style-type: none">• HCC – Highways Authority
2.	Survey and clean highway drainage system	That the highway drainage system in Kymswell Road and Hayley Common be put forward for inclusion on the Integrated Works Programme 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">• HCC – Highways Authority
3.	Further detailed modelling of surface water flows	Include the area from Shephall Way above Kymswell road to Bandle Rise in the Stevenage Surface Water Management Plan assessments starting in 2016.	<ul style="list-style-type: none">• HCC - LLFA
4.	Investigation of Property level protection	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">• Property owner• HCC – LLFA

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 include the area from Shephall Way above Kymswell road to Bandley Rise in the Stevenage Surface Water Management Plan assessments starting in 2016.
2. To signpost residents 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;

3. To survey and clean the highway drainage system in Kymswell Road and Hayley Common.
4. To inspect, clean and maintain gullies.

6.3 Householders

The following are suggested actions to be undertaken by householders

5. To consider taking measures at a property level to reduce flood risk.

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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