

Hertfordshire County Council Flood Investigation Report Knebworth, Hertfordshire



Photos courtesy of local residents



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Revision Schedule

Hertfordshire County Council Knebworth Flood Investigation Report

Thursday 8 January 2015
Revision 4 - Final

Rev	Date	Details	Author	Checked and Approved by
1	13/11/14	For internal consultation	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
2	19/11/14	Text revision following comments from AH	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
3	21/11/14	For RMAs consultation	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
4	08/01/15	Final amendments	Suzanne Phillips Project Officer Flood Risk Management 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 Knebworth in the early hours of the morning of 7 February 2014, heavy rainfall fell on saturated ground, causing surface water runoff from farmland onto an adjacent road. Eighteen properties were subsequently flooded internally and two properties suffered external flooding as a result of this runoff.

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 Knebworth.

There is some history of flooding in this area of Knebworth dating back to 1978 and 1987, which prompted the original housing developer to add additional surface water drainage through a resident's garden. However, the flooding event on 7 February 2014 was the first time properties had been flooded internally.

It has been concluded that the flooding that occurred on 7 February 2014 was primarily as a result of a succession of storms combining with heavy rainfall over an extended period of time. This saturated the surrounding catchment in the days prior to the flood event. Any additional rainfall was unable to soak into the ground resulting in surface water runoff. This runoff made its way to the edge of farmland, overflowing and flooding an adjacent road, and subsequently flooding properties in a further two streets.

Other factors have been identified as contributing to the flooding on the 7 February 2014 including; a possible overspill of the A1(M) attenuation storage pond and the existing highway drainage system being unable to cope with the volume of flood water.

As part of the Technical Assessment Report, produced by consultants appointed by HCC, a list of recommendations that might help to manage flood risk to Knebworth has been put forward. This report looks at the feasibility of each of these recommendations and highlights which, if any, RMAs would need to be involved.

The main recommendations explored are:

- Survey and clean the highway drainage system;
- Increased frequency of gully cleaning;
- Develop a programme of surface water management measures;
- Individual property level protection;
- Monitor the effectiveness of A1(M) attenuation storage pond.

There is no one solution to resolve the flooding in Knebworth and there is no guarantee that flooding can be prevented particularly under the exceptional

conditions similar to those that occurred on 7 February. 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 Knebworth:

- HCC as LLFA
- North Hertfordshire District Council
- HCC as Highway Authority
- Highways Agency

After 7 February 2014, HCC received reports that several residential properties had suffered internal flooding in Orchard Way and Broom Grove, Knebworth.

As a preparatory step to identify if a detailed flood investigation should be carried out, officers from the Flood Risk Management Team at HCC wrote to those believed to have been affected, to gather further information and confirm the number of properties flooded internally.

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 Site Location

The village of Knebworth is situated to the south of Stevenage, in the north of Hertfordshire. This is illustrated in Figure 1.1. The site affected by flooding is located in the west of Knebworth, to the east of Gypsy Lane, as shown in Figure 1.2.

Figure 1.1 Knebworth, Hertfordshire – Location Map



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Figure 1.2 Area affected by flooding in Knebworth



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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. Two residents recalled flooding events in 1978 and 1987. One Orchard Way resident also confirmed that a surface water drain was constructed through a neighbour's garden by the housing developer, following the 1987 flood, in order to alleviate the flooding issue.

A summary of recent flood events is provided in table 2.1. The flood events which occurred after 7 February suggest a problem with the highway drainage such as a blockage.

Table 2.1 Orchard Way and Broom Grove, Knebworth: Flood Events Summary

Date	Source	Summary
1978 (day unspecified)	Residents	Roads and external areas of properties
1987 (day unspecified)	Residents	Roads and external areas of properties
7 February 2014	Residents	Internal and external areas of properties, roads
8 August 2014	Residents and NHTB Consultancy	Roads and external areas of properties
19 September 2014	Residents	Roads and external areas of properties
13 October 2014	Residents	Roads and external areas of properties

3. Assessment of 7 February 2014 flood event

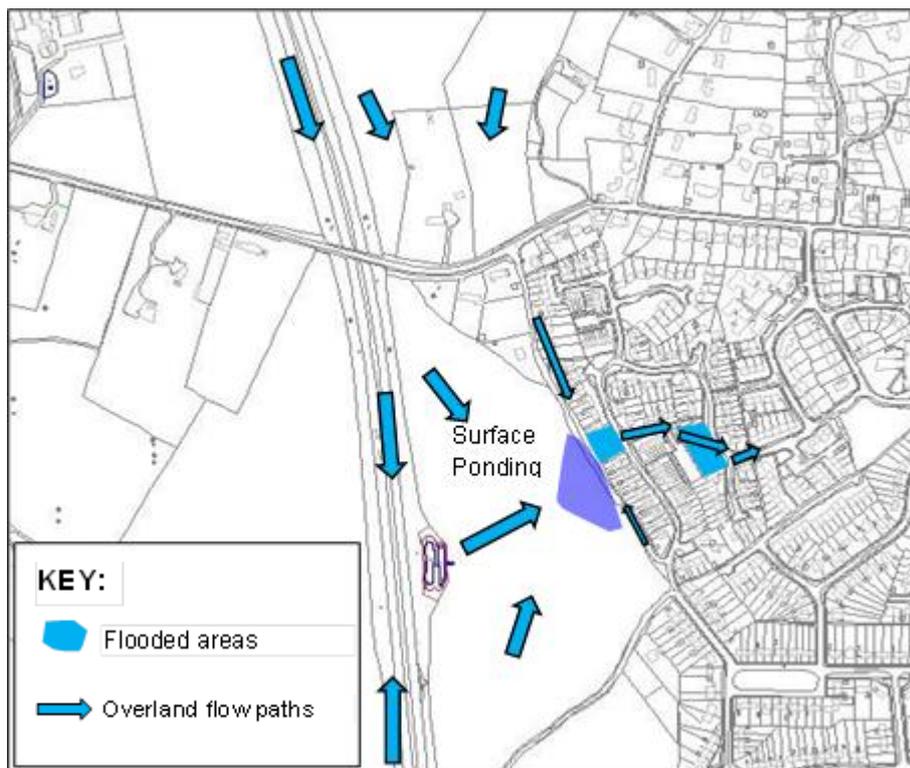
3.1 Observations

In Knebworth in the early hours of the morning on 7 February 2014, heavy rainfall fell on saturated ground, causing surface water runoff from farmland onto an adjacent road, Gypsy Lane. The water flooded the lane and subsequently flowed into rear gardens in Orchard Way before entering these properties through rear doors. Water also found its way around the sides of Orchard Way properties, into front gardens and the road, flowing down the natural slope towards the entrance to garages and the rear gardens of Broom Grove properties.

Properties in Broom Grove were flooded as the water continued through their rear gardens, entering via rear doors. Water flowed out of front doors and into front gardens and the road, eventually ponding in the road at the entrance of the walkway to Gibbons Way.

A total of 20 properties were flooded; 18 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

Following a series of heavy storms the ground in the catchment surrounding Knebworth was saturated with no capacity to allow for the infiltration of additional rainfall.

3.3 Sources of flooding

3.3.1 Surface water runoff (pluvial)

The catchment that drains to the area which flooded measures approximately 29 ha. This is shown in Figure 3.2. The catchment is relatively steep, sloping eastwards from a high point to the west at approximately 122m elevation, to the lowest point in Broom Grove in the east at an elevation of approximately 101m.

There is arable farmland to the west of Gypsy Lane, with the A1(M) forming the western catchment boundary.

There is also an attenuation storage pond for the A1(M), which is designed to slow the passage of surface water runoff from the motorway. The runoff is stored during peak flow and released slowly at a controlled rate to allow infiltration into the ground after peak flow has passed.

Arable land and part of Park lane form the northern part of the catchment.

Surface water runoff from the whole catchment is funnelled into the field adjacent to Gypsy Lane, opposite the rear gardens of Orchard Way. Any overspill from the A1(M) attenuation storage pond would also flow to this point.

3.4 Highway drainage

Surface water from a section of the A1(M) (approximately 1,000m of drains) drains to the attenuation storage pond in the field to the west of Gypsy Lane. The pond then discharges by infiltrating into the ground.

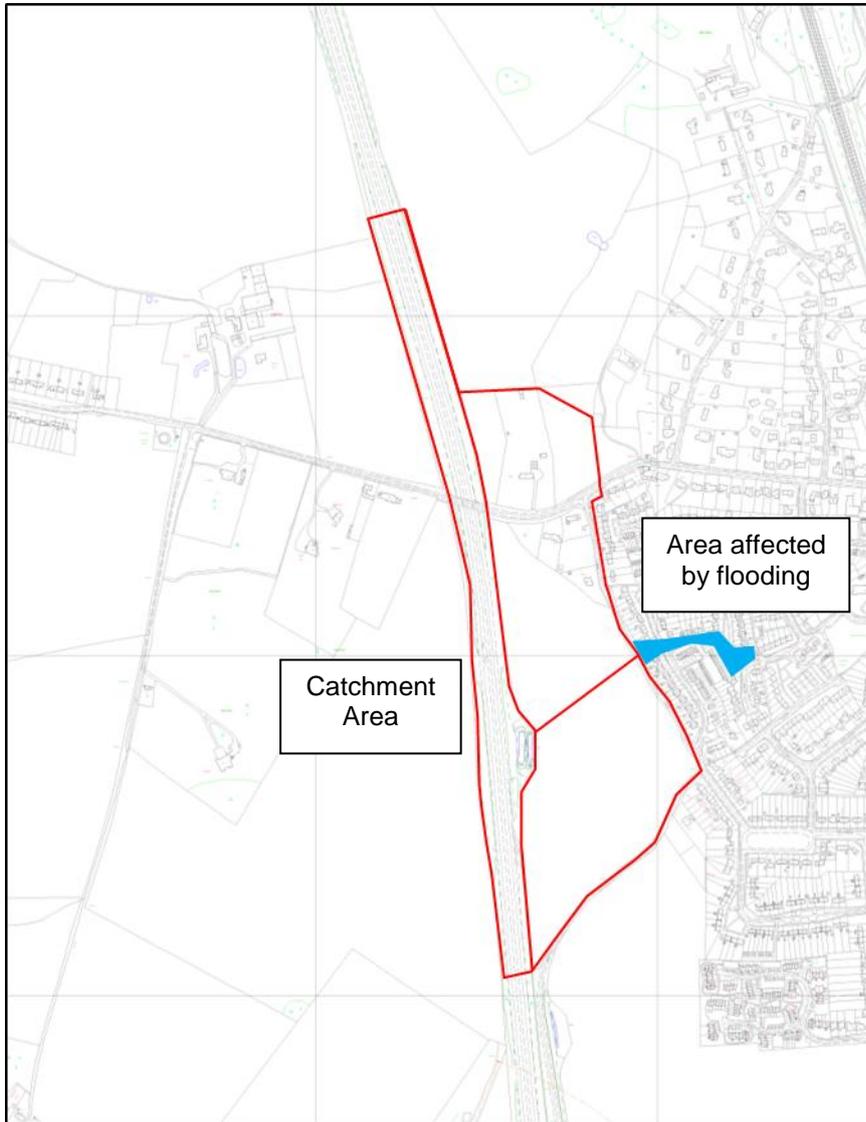
Gypsy Lane has one road gully at the rear of Orchard Way, connecting underground to the front of Orchard Way properties and into the estate's highway drainage system. Orchard Way and Broom Grove have a series of road gullies which lead to soakaways.

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:

- Winter 2013/2014 was one of the wettest on record for the region; and heavy (while not extreme) rainfall falling on already highly saturated ground with an elevated groundwater table has caused flood flows.
- Rainfall onto saturated farmland to the west of the site caused surface water runoff to flow directly towards the affected area.
- The A1(M) attenuation storage pond may have over spilled, contributing to the surface water runoff from the fields.
- Highway drainage in Gypsy Lane, Broom Groove and Orchard Way was overwhelmed and unable to cope with the volume of flood water.

Figure 3.2 Catchment boundary



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4. Responsible authorities and landowners

HCC as the LLFA has investigated the flooding at Knebworth 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 North Hertfordshire District Council

North Hertfordshire District Council are the local planning authority for the Knebworth 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 Highways Authority

Gypsy Lane, Orchard Way and Broom Grove 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 Highways Agency

The Highways Agency is the highway authority for the A1(M).

4.5 Landowners

Landowners are responsible for the management of their land, including any associated drainage. This will encompass drainage ditches, land management practices and surface water runoff. They also have the right to allow their land to drain naturally but must manage this so that it does not cause a nuisance to others.

Residential property owners are responsible for maintaining any soakaways which lie within their land.

5. Conclusions and recommendations

5.1 Conclusions

A major factor contributing to the flooding was the amount, longevity and intensity of the rainfall during the days preceding the flood event on 7 February 2014. The winter of 2013/14 has been confirmed to be the wettest winter on record for the UK.

This meant that with saturated soils throughout the catchment, the rain water could not enter the natural drainage system.

The highway drainage system would have had a limited capacity in reducing the flood flows. It is likely that the A1(M) attenuation pond over spilled, contributing to the overall volume of water flowing towards the affected area.

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 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 Knebworth on 7 February 2014.

No.	Recommendations	Comments	RMAs and other parties to be involved
1.	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, although there is a Repair & Renew Grant available for people that suffered internal flooding between 1 April 2013 and 31 March 2014. Advice is available from North Hertfordshire District Council.	<ul style="list-style-type: none">• North Hertfordshire District Council
2.	Survey and clean highway drainage system	That the highway drainage system in Gypsy Lane, Broom Grove and Orchard Way 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.	Increase frequency of gully cleaning	That consideration is given to adding the gullies along Broom Grove and Orchard Way to the list of vulnerable gullies to increase the frequency of their cleaning schedule to greater than the current 18 month cycle.	<ul style="list-style-type: none">• HCC – Highways Authority
4.	The development of a programme of surface water management measures	This to include a programme of measures that could include highways related works and land management measures in the western rural catchment. These options will need to be modelled to ensure that they	<ul style="list-style-type: none">• HCC – LLFA• HCC – Highways Authority• North Hertfordshire District Council

No.	Recommendations	Comments	RMAs and other parties to be involved
5.	Monitor effectiveness of A1(M) attenuation storage pond	<p>carry no increased flood risk downstream. Any identified programme will be subject to appropriate cost-benefit appraisal as part of any bid process for funds to implement it.</p> <p>Monitor the effectiveness of the A1(M) attenuation storage pond as part of regular inspection and maintenance.</p>	<ul style="list-style-type: none"> Highways Agency

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 relevant partners, including the Highways Authority, North Hertfordshire District Council and local landowners to develop and test a programme of surface water management measures to minimise, manage and mitigate any surface water runoff entering Gypsy Lane, and subsequently Orchard Way and Broom Grove.

6.2 Highway Authority

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

2. To survey and clean the highway drainage system in and around Gypsy Lane, Broom Grove and Orchard Way.
3. To consider adding highways gullies along Broom Grove and Orchard Way to the list of vulnerable gullies in order to increase the frequency of their cleaning to greater than the current 18 month cycle.
4. To work with the LLFA and other partners to develop and test a programme of surface water management measures to minimise, manage and mitigate any surface water runoff entering Gypsy Lane, and subsequently Orchard Way and Broom Grove.

Highways have already started on some of the actions listed above. The main soakaways and associated gullies have been cleaned, as well as the connection between Gypsy Lane and Orchard Way. The ditches on Gypsy Lane have also be re-dug.

6.3 Highways Agency

The following are suggested actions to be undertaken by the Highways Agency;

5. To monitor the effectiveness of the A1(M) attenuation storage pond as part of regular inspection and maintenance.

The Highways Agency carried out works to the A1(M) attenuation storage pond in February 2011. The works redesigned the capacity of the lagoon to increase the storage capacity of the soakaway to contain the 10-year return period design storm, increased by 20% for climate change and decrease the half drain times.

Under their Asset Support Contract Maintenance Requirements Plan (MRP) the A1(M) attenuation storage pond is on an annual inspection programme.

6.4 North Hertfordshire District Council

The following are suggested actions to be undertaken by North Hertfordshire District Council;

6. To support affected residents in securing nationally funded Repair and Renew Grant for the installation of appropriate property flood protection measures.
7. To work with the LLFA and other partners to develop and test a programme of surface water management measures to minimise, manage and mitigate any surface water runoff entering Gypsy Lane, and subsequently Orchard Way and Broom Grove.

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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