

Hertfordshire County Council Flood Investigation Report

Bragbury End, Hertfordshire



Photos courtesy of local residents



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Revision Schedule

Hertfordshire County Council Bragbury End Flood Investigation Report

Friday 23 January 2015

Revision 5 - Final

Rev	Date	Details	Author	Checked and Approved by
1	19/11/14	For internal consultation	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
2	21/11/14	Text revision following comments	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	Further amendments	Suzanne Phillips Project Officer Flood Risk Management HCC	Andy Hardstaff Flood Risk Management Team Leader HCC
5	23/01/15	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 Bragbury End in the early hours of the morning of 7 February 2014, heavy rainfall fell on saturated ground, leading to high levels of surface water runoff from farmland onto an adjacent road. Six properties were flooded as a result of this runoff; five internally. The run off also filled a flood storage area at the rear of properties, before eventually over spilling into an open watercourse and flooding a commercial property through the rear of the building.

A second area flooded as a result of surface water runoff from higher ground behind a property, causing 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 Bragbury End.

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. Rainfall was then unable to soak into the ground, resulting in increased levels of surface water runoff.

Blocked highway gullies were considered as a factor in the 7 February flooding event, being filled with silt and debris. However, their capacity to cope with the flood water would have been limited even if they had been fully clear as they have limited ability to intercept large volumes of water running over the road surface.

The over spilling of a flood storage area also contributed to the flooding of the commercial property.

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 Bragbury End 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;
- Survey and clean the land drainage on land owned by Network Rail;
- Survey flood storage area;
- Individual property level protection;
- Develop a programme of surface water management measures.

There is no one solution to resolve the flooding in Bragbury End 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 Bragbury End:

- HCC as LLFA
- Stevenage Borough Council
- HCC as Highway Authority
- Thames Water Utilities Limited
- Network Rail (stakeholder)

After 7 February 2014, HCC received reports that several residential properties had suffered internal flooding in Bragbury Lane, Bragbury End.

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

Bragbury End is situated in the south east of Stevenage, as illustrated in Figure 1.1. The site affected by flooding is located in the south east of Bragbury End, as shown in Figure 1.2.

Figure 1.1 Bragbury End, Hertfordshire – Location Map



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Figure 1.2 Area affected by flooding in Bragbury End



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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 recalled at least one serious flooding incident and several lesser incidents where floodwater entered gardens. Flooding of front gardens has occurred on many occasions. One resident confirmed their front porch was flooded on 24 December 2013.

In the weeks before the 7 February flooding event, Residents contacted HCC Highways on several occasions with concerns regarding blocked gullies in Bragbury Lane.

There was another flooding event on 13 October 2014, where the front garden and garage of a property was flooded by surface water runoff from nearby building works.

3. Assessment of 7 February 2014 flood event

3.1 Observations

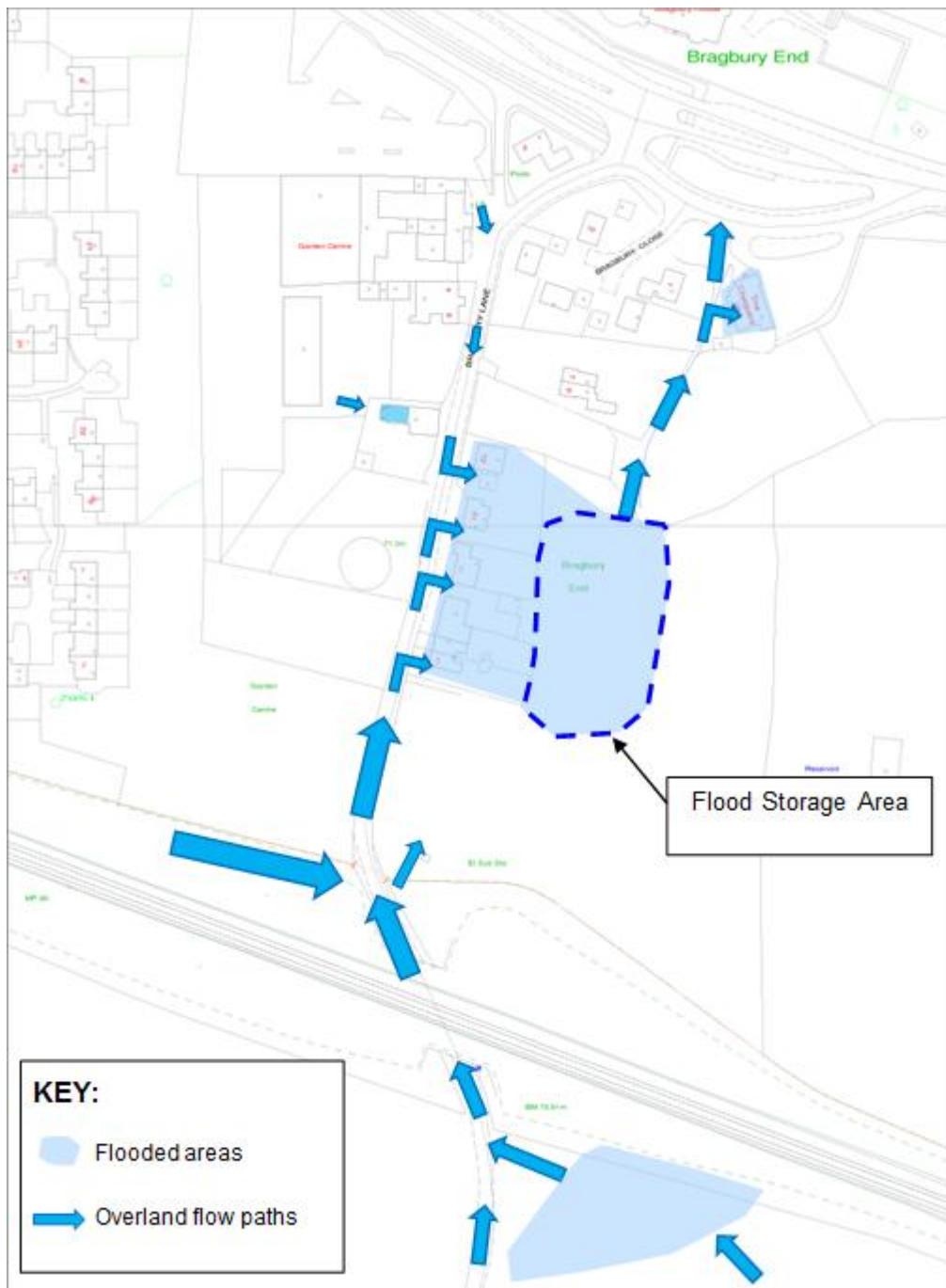
In Bragbury End in the early hours of the morning of 7 February 2014, heavy rainfall fell on saturated ground, causing surface water runoff from farmland onto Bragbury Lane. The water flowed down the Lane, flooding front gardens and properties on the east side.

The water also found its way around the end of the first property on the east side of Bragbury Lane, into rear gardens towards a flood storage area. This eventually over spilled into an open watercourse downstream, which could not contain the additional water and flooded a commercial property through the rear of the building.

A second area on the west side of Bragbury Lane also flooded as a result of surface water runoff from higher ground behind a property, causing internal flooding.

Figure 3.1 shows the flow routes the water took in each area of flooding.

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 Bragbury End was saturated with no capacity to allow for the infiltration of additional rainfall.

3.3 Sources of flooding

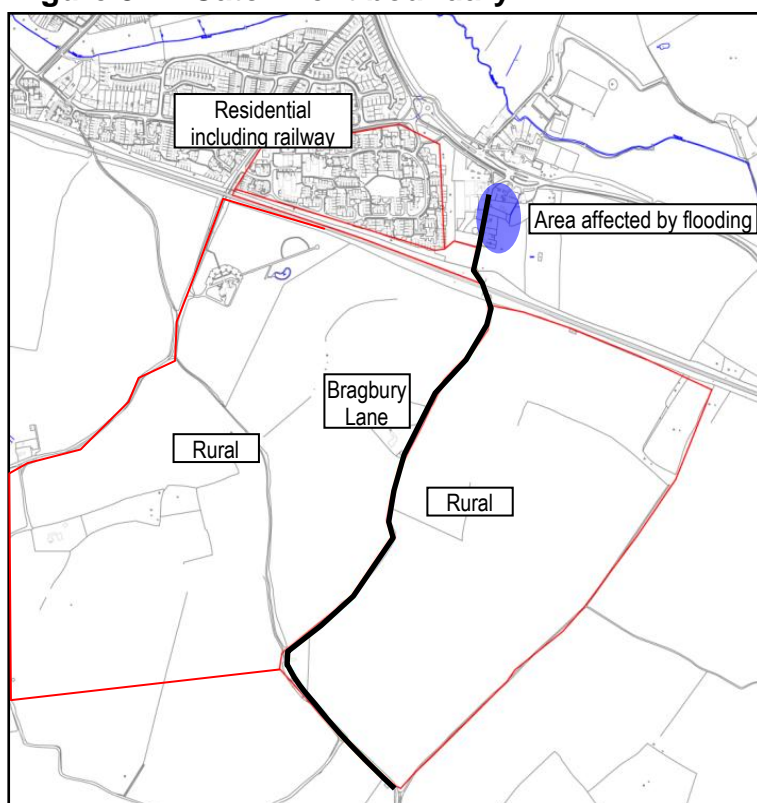
3.3.1 Surface water runoff (pluvial)

The catchment that drains to the area which flooded measures approximately 192ha. This is shown below in Figure 3.2. The catchment is relatively steep, sloping northwards from a high point to the south at approximately 120m elevation, to the lowest point in Bragbury Lane at the northern boundary of the catchment (where flooding occurs) at an elevation of approximately 70m.

The land south of the railway is mostly arable farmland. The railway line bisects the catchment in a west to east alignment, funnelling surface water runoff from most of the arable land in the south east part of the catchment through a road tunnel underneath the elevated tracks.

Arable farmland to the east of Knebworth forms the south western part of the catchment south of the railway, sloping from a high point of 94m northwards towards the railway. The north and west of the catchment are residential areas of outer Stevenage. This area falls from a high point at its western boundary of approximately 80m to the low point in Bragbury Lane.

Figure 3.2 Catchment boundary



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3.4 Highway drainage

There is a highway drainage system serving the lower section of Bragbury Lane, with a few isolated gullies. Gullies in the upper (southern) part of Bragbury Lane were seen to be filled with silt and debris during a drainage survey carried out on 10 October 2014.

3.5 Land drainage

There is a small land drainage culvert under the railway, emerging to the north of the railway into the area adjacent to the flood storage area.

3.6 Condition of watercourses

There is a short length of ordinary watercourse within the catchment, flowing into the rear garden of the commercial property before entering a large brick culvert.

3.7 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 south of the site caused surface water runoff to flow directly towards the affected area.
- Water also overspilled from a flood storage area, into an open watercourse which then flooded a commercial property.
- A second area flooded as a result of surface water runoff from higher ground behind a property.
- As surface water flowed down Bragbury Lane, accompanying silt and debris caused gullies to become blocked, limiting their effectiveness at draining water from the road.

4. Responsible Authorities and landowners

HCC as the LLFA have investigated the flooding at Bragbury End to establish the relevant RMAs that have Flood Risk Management Functions in accordance with the FWMA 2010 as part of this study. Those RMAs and their relevant powers and functions are set out below, as well as additional stakeholders and their responsibilities.

4.1 Hertfordshire County Council as Lead Local Flood Authority

HCC as the LLFA for its area 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 identify where possible, potential solutions as discussed in this report.

The LLFA 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 Stevenage Borough Council

The Borough Council have powers to carry out flood improvement works on ordinary watercourses under Section 14A of the Land Drainage Act 1991 as amended by the FWMA 2010. These powers are discretionary and works are subject to consultation with HCC and the Environment Agency.

Stevenage Borough Council are also the local planning authority for the Bragbury End 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

Bragbury Lane is an adopted highway. 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 Utilities Limited

Thames Water has responsibility for the safe and clean disposal of foul water sewerage, as well as for public surface water sewers. They are also responsible for the operation and maintenance of the flood storage area.

Additional Stakeholders:

4.5 Network Rail

Network Rail is responsible for any drainage structures on their land such as culverts.

4.6 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.

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. This also caused the flood storage area to overspill.

Whilst gullies in Bragbury Lane were blocked with silt and debris during the flood event, 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 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 Bragbury End 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 Stevenage Borough Council.	<ul style="list-style-type: none">• Stevenage Borough Council
2.	Survey and clean highway drainage system	That the highway drainage system in Bragbury Lane 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 Bragbury Lane 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.	Survey and clean land drainage culverts under railway	That the land drainage system on Network Rail's land 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">• Network Rail (stakeholder)

No.	Recommendations	Comments	RMAs and other parties to be involved
7.	Survey flood storage area	That the flood storage area be inspected to ensure it is operating as per its design standard and that there are no operating issues.	<ul style="list-style-type: none"> • Thames Water
8.	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 south western rural catchment. These options will need to be modelled to ensure that they 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.	<ul style="list-style-type: none"> • HCC – LLFA • HCC – Highways Authority • Stevenage Borough Council

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, Stevenage Borough 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 Bragbury Lane.

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 Bragbury Lane.
3. To consider adding highways gullies along Bragbury Lane 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 Bragbury Lane.

6.3 Network Rail

The following are suggested actions to be undertaken by Network Rail;

5. To survey and clean the drainage system associated with the railway bridge and adjacent Network Rail land at Bragbury End.

6.4 Thames Water Utilities Limited

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

6. To survey the flood storage area and ensure it is operating according to its design standard.

6.5 Stevenage Borough Council

The following are suggested actions to be undertaken by Stevenage Borough Council;

7. To support affected residents in securing nationally funded Repair and Renew Grant for the installation of appropriate property flood protection measures. (Stevenage Borough Council is currently investigating this option)

8. 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 Bragbury 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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