

Hertfordshire County Council Flood Investigation Report

Shenley Hill, Radlett
Hertfordshire



Radlett, 2010
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Revision Schedule

Hertfordshire County Council Radlett Flood Investigation Report

August 2015
Revision 3

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	05/08/15	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

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 Radlett on 19 September and 15 October 2014, two rainfall events caused excessive surface water runoff. The September incident occurred after an intense rainfall event over a period of approximately one hour. The October incident occurred due to a less intense rainfall event but over a period of approximately 20 hours, resulting in high runoff volume. One property is known to have 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 Radlett.

There is a long history of flooding in this area prior to the 2014 flood events.

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.

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 Radlett 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:

- Individual property level protection;
- Survey and clean the highway drainage system.

There is no one solution to resolve the flooding in Radlett 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
- Hertsmere Borough Council
- Thames Water

HCC received a report a residential property had suffered internal flooding in Shenley Hill, Radlett.

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:

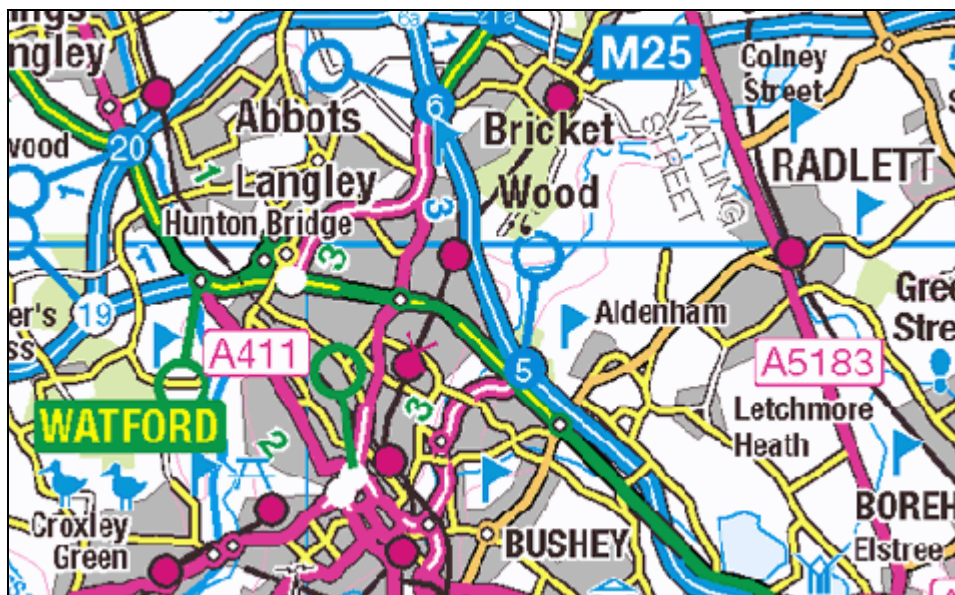
- Undertake detailed face-to-face surveys with occupants of all properties within the zone affected by flooding;
- Contact relevant drainage authorities;
- Seek details of flood damages and depth of flooding, including any insurance claims, from those affected;
- Undertake a detailed topographical survey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

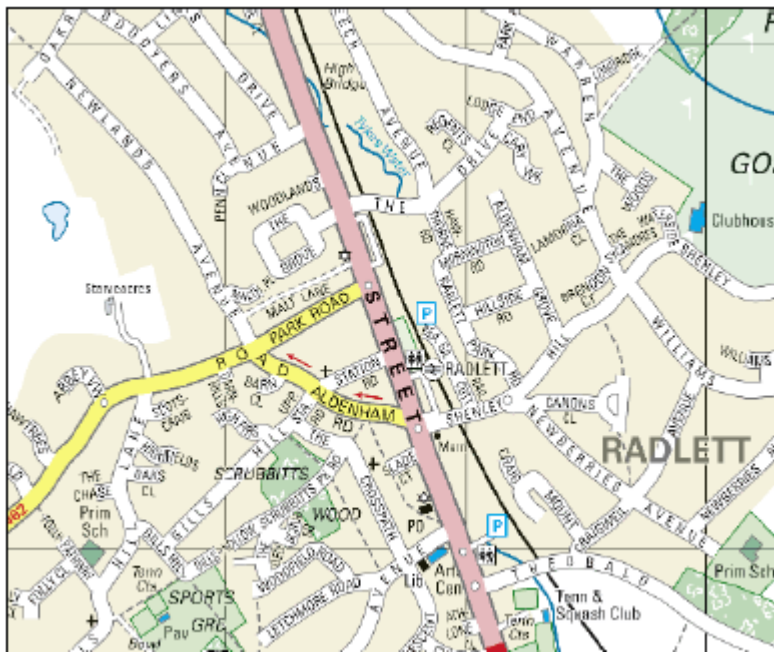
Radlett is situated towards the south west of Hertfordshire, north east of Watford. This is illustrated in Figure 1.1. The site affected by flooding is located in the centre of the town, in Shenley Hill, close to the railway station as shown in Figure 1.2.

Figure 1.1 Radlett, Hertfordshire – Location Map



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Figure 1.2 Area affected by flooding in Radlett



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2. Background and History of flooding

2.1 Previous flood events

The Hertsmere Borough Council Strategic Flood Risk Assessment records Shenley Hill as a site at risk of surface water flooding and there have been numerous reports of flooding prior to 2014.

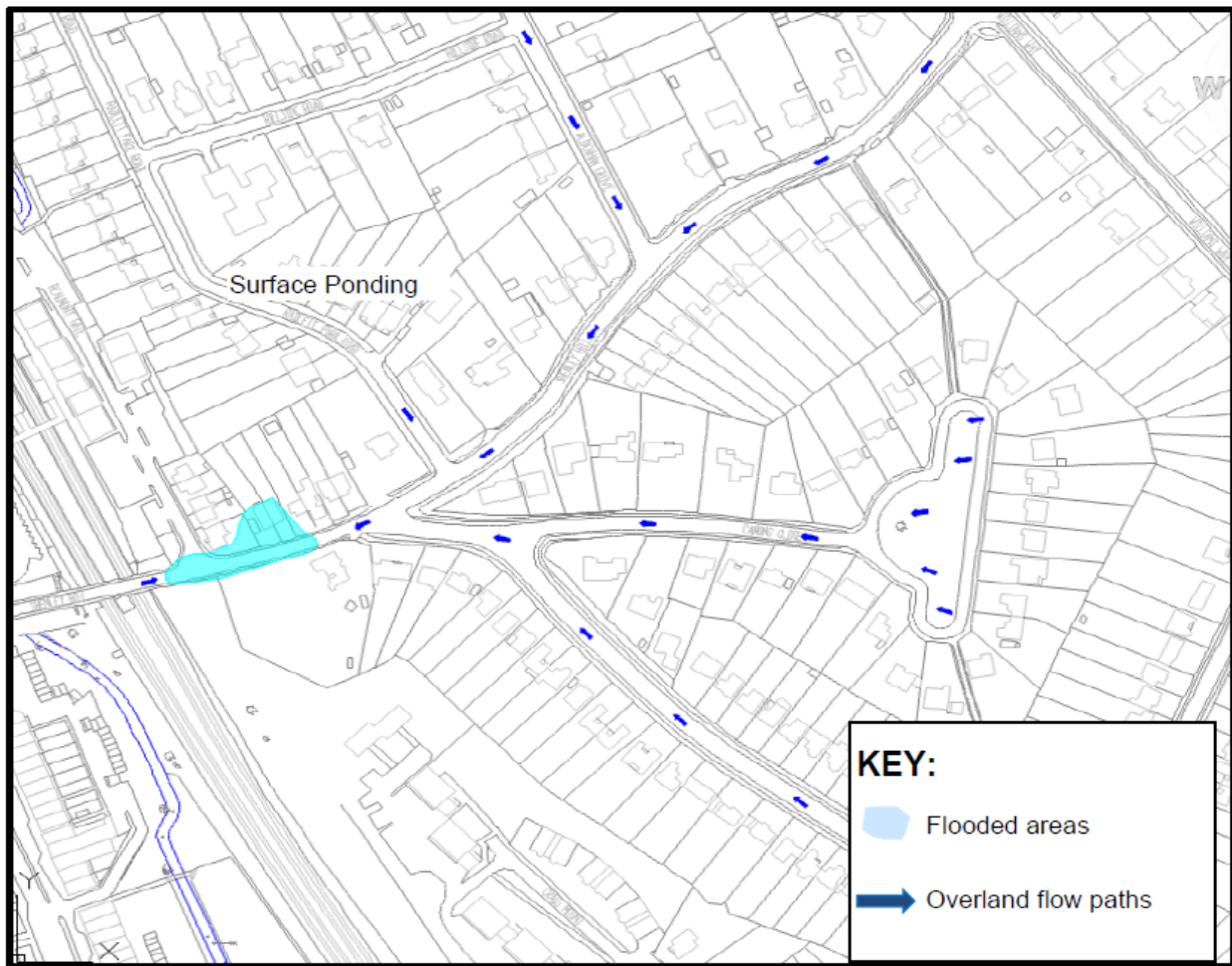
3. Assessment of 19 September and 15 October 2014 flood events

3.1 Observations

The flooding is a result of surface water runoff originating from higher ground at the top of Shenley Hill, and flowing down toward the railway bridge at the base of the hill. Any flow paths beyond this point are hindered by the railway and the road bridge over it, and the surface water has no option but to pond at the base of the hill, inundating the property at this location, and possibly the station approach road adjacent.

1 property was flooded, both internally and externally. Figure 3.1 shows the flow route the water took.

Figure 3.1 Overland flow paths



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3.2 Ground conditions

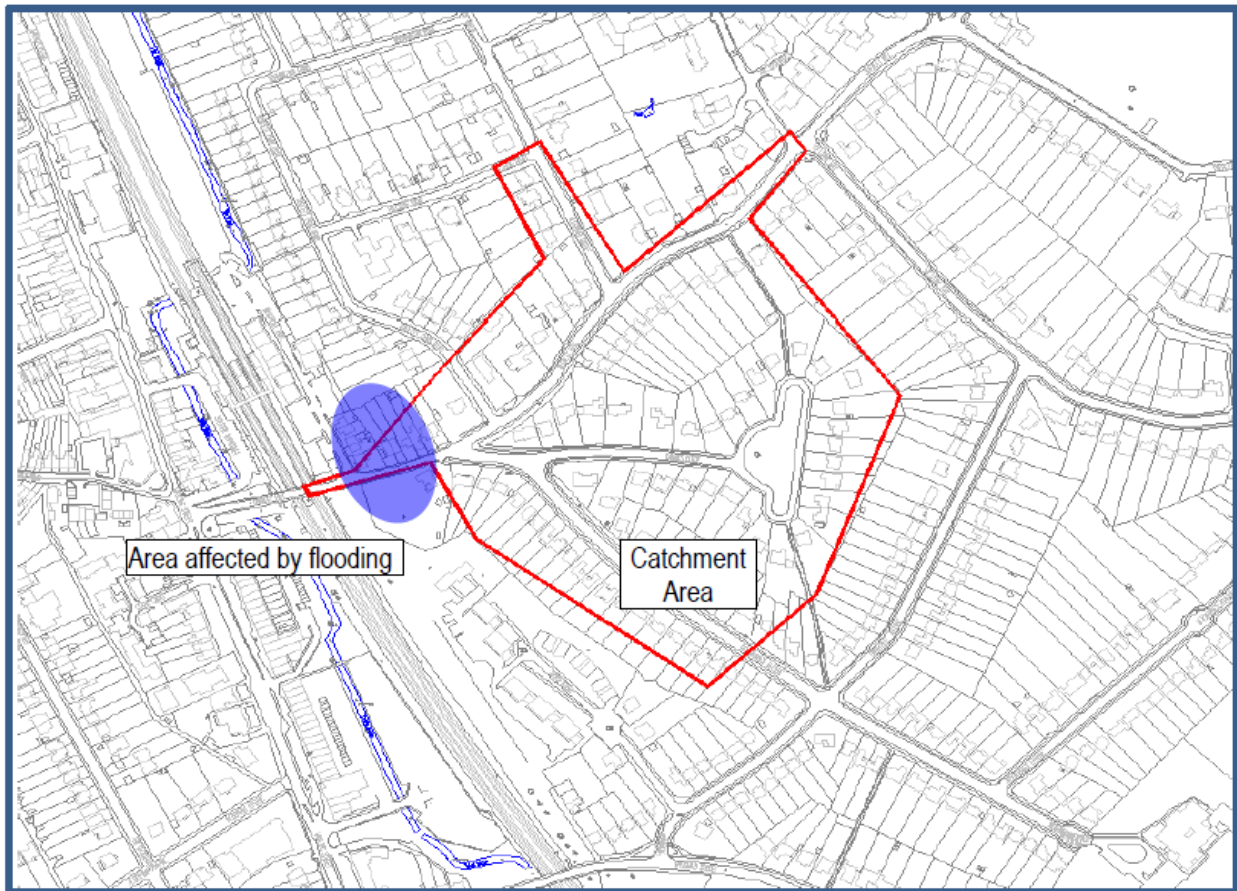
The two flooding events were recorded following a period of dry ground conditions in September and wet conditions in October. However, as the majority of the catchment is impermeable it is not thought that preceding weather conditions would have had a significant impact on the flow characteristics. It 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 1.07 ha. This is shown in Figure 3.2. The catchment drops relatively steeply from its high point on Shenley Hill, at approximately 100.0m, down to approximately 74.0m at the base of Shenley Hill by the railway. The road rises over the railway to an approximate height of 76.4m.

Figure 3.2 Catchment boundary



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3.4 Surface Water Sewerage (Thames Water)

The highway drainage appears to become adopted at the junction of Shenley Hill and Newberries Avenue. The route of all drainage from this point is maintained by Thames Water.

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
- 19 September: intense rainfall event over a period of approximately one hour
- 13 October: less intense rainfall event over a period of approximately 20 hours but with significantly more runoff volume than previous event
- Highway drainage in Shenley Hill 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 Hertsmere Borough Council

Hertsmere Borough 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

Shenley Hill 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

Thames Water manages the public surface water and foul water sewer networks in this area of Hertfordshire. The network must operate within the rules laid out as part of the Water Industry Act 1991. Thames is financially regulated by OfWAT.

Thames Water keep a register of internal and external flooding of properties. This register is used as the evidence to justify improvements to the network and is used

to inform performance against Thames Water’s ‘outcome delivery incentives’. Only Thames Water has the authority to alter sewers and to manage the flood risk associated with them.

5. Conclusions, potential mitigation options and recommendations

5.1 Conclusions

The flooding was the result of excessive surface water runoff from an urbanised catchment. One incident occurred after an intense rainfall event over a period of approximately one hour. The second incident occurred due to a less intense rainfall event but over a period of approximately 20 hours, resulting in high runoff volume.

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.

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 at the base of Shenley Hill. Consider installing additional oversized gullies with some capacity for low order events at the low point, to drain into the surface water system. There are no gullies at the low point so any ponding will increase quickly.
Advantages: Improved collection and disposal of surface water from the natural flow path.
Issues: Increased maintenance liability
Budget cost estimate: £5,000 - £20,000
Include in Recommendations? No. Would not help during storm events and could cause additional flooding further downstream.

5.2.2 Improvement to Highway Drainage – Surface Water Sewer

Remodelling of the surface water sewer to determine if the sewer can be replaced / upsized to cope with higher order rainfall events.

Advantages: Clearer drainage route for surface water sewer, Shenley Hill should experience no hydrological overflow.

Issues: Modelling may exclude any suitable and cost beneficial options for the sewer network. No physical benefit for the money spent.

Budget cost estimate: £7,000

Include in Recommendations? No. The surface water sewer may have performed as it was designed to do so and Thames Water would not be funded to deliver upgrades above that its regulator permits.

5.2.3 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. 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 (estimate approx. 4 properties in Shenley Hill, 2 in Beaumont Gate)

Include in Recommendations? Yes

5.2.4 Improvement to Highway Drainage – Surface Water Collection

Investigate the possibility of placing raised tables along Shenley Hill, to reduce the overland flow rate and hold back some initial flows, or slow the rate of runoff down. The surface water system may be able to discharge flows more effectively for low order events.

Advantages: Potentially cost effective way to reducing initial surface water runoff intensity, in lieu of option 5 below.

Issues: Will create effective speed humps in road and cause local pooling at each location. Gullies may require adding if there are not sufficient numbers up Shenley Hill to drain these locations effectively.

Budget cost estimate: £30,000-£50,000

Include in Recommendations? The consultants do not recommend this option at present. It is likely to have little benefit and little storage capacity due to the steepness of the road. It would also be classed as traffic calming and require a public consultation, together with the advertising of Traffic Regulation Order that can receive objections. HCC as Highway Authority would not provide traffic calming to solve a drainage issue.

5.2.5 Improvement to Highway Drainage – Surface Water Sewer
Following Option 2 and if viable, increase the surface water sewer capacity, to accept higher rainfall intensity events.
Advantages: Reduce surface water flood risk to catchment.
Issues: Will not drastically improve the drainage capacity as space may not be available for large scale improvement, such as a sub-surface storage tank. Drainage of any new works would still be constrained by high river flows in high return period events.
Budget cost estimate: £150,000+
Include in Recommendations? The consultants do not recommend this option at present

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 Radlett in September and October 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.	<ul style="list-style-type: none">• Property owner• HCC – LLFA
2.	Survey and clean highway drainage system	That the highway drainage system in Shenley Hill 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

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 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;

1. To survey and clean the highway drainage system in Shenley Hill.

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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