Section 19 Flood Investigation

Key findings

Flood location: Deerswood Avenue, Hatfield, AL10 8RZ

Number of properties confirmed flooded: 1

Trigger flood event date: 23 June 2016

Previous flood events: No record of previous flooding

Flooding mechanism: Surface water runoff caused by intense rain.

Identified risk management authorities: Lead Local Flood Authority

Actions after the flood event:

Recommendations:

- Property owner - Improve property resistance
- LLFA - Investigate the feasibility of attenuating runoff.
- LLFA - Inspect ordinary watercourse culvert

Investigating officer: James Lester

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Summary:
Water from the road pooled around residencies and ingressed into some living areas. A flowpath from the rear is predicted but there is no evidence to confirm this and so it would seem that this flow is captured by the ordinary watercourse in this area. The highway drainage system can not be expected to have coped with the scale of the rainfall event. There is no evidence that the ordinary watercourse or the surface water sewers were surcharged.

1. Introduction

1.1. Background

How the LLFA became aware of the flooding:

- Two calls to the Fire and Rescue Service.
- LLFA followed up reports with a questionnaire survey sent to potentially impacted residents.

Reasons for investigating:
A property was flooded internally and so 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.

1.2. Location of investigation site

Site address: Deerswood Avenue, Hatfield, AL10 8RZ
District: Welwyn-Hatfield
Regional flood and coastal committee catchment: Thames

Figure 1 Deerswood Avenue

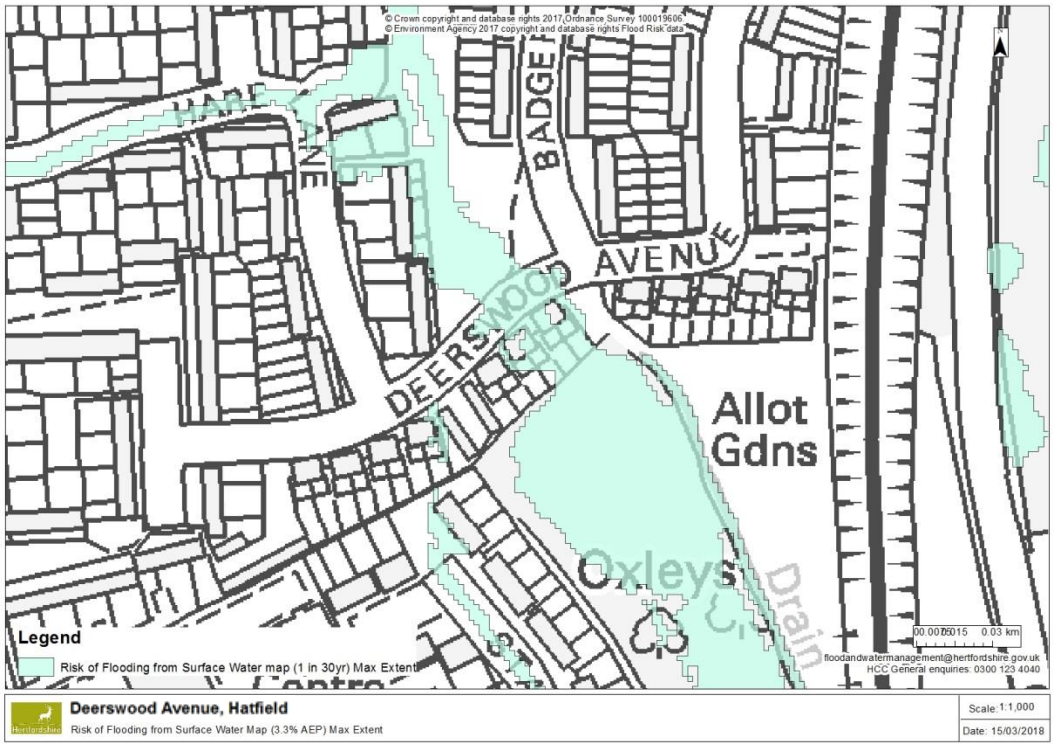
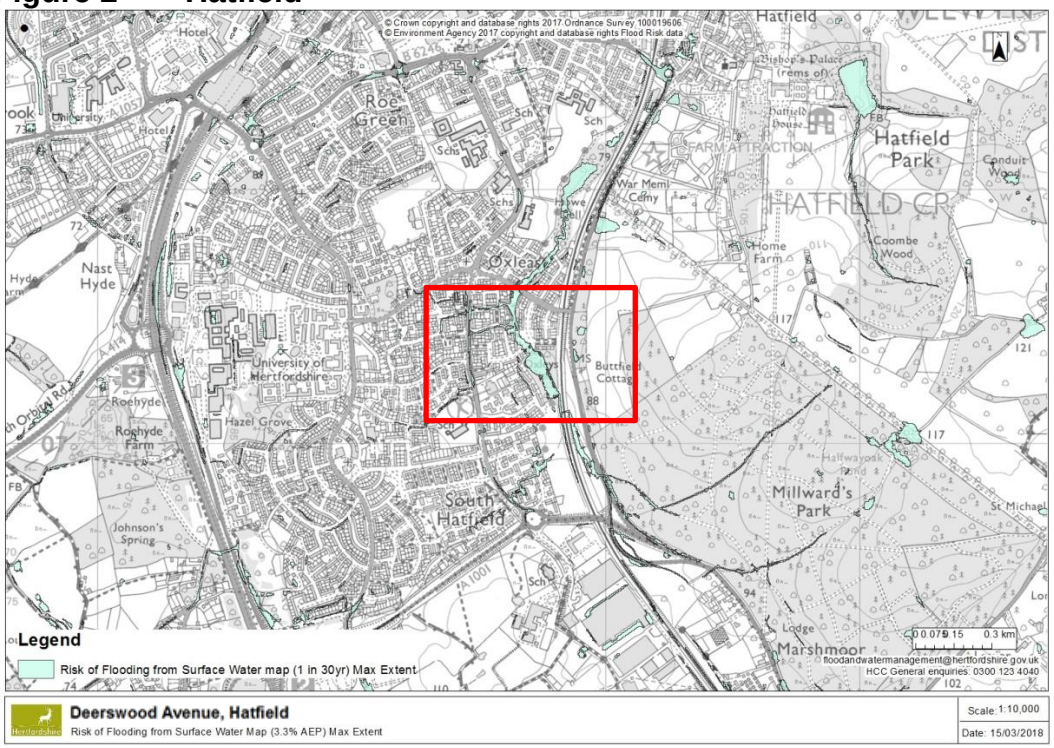


Figure 2 Hatfield



1.3. Anecdotal evidence

Reports from other organisations

- Fire and Rescue Service

18:39 Flooding call.
18:45 Flooding inside. Attended - advice only.

- Hertfordshire County Council as the Highway Authority

No reports via the Highway fault reporting service

Questionnaire survey

A questionnaire survey was sent out to all residents in Hertfordshire who may have been impacted by the 23 June 2016 flood event. This was conducted by HCC as the LLFA. The purpose of the questionnaire was to establish the extent of the flood event, the number of properties impacted and an indication of the mechanisms that caused flooding to property or critical infrastructure.

- One out of eight flood questionnaire returned.
- Dampened carpets in the living area and 6 inches of water in the garden.
- No history of flooding other than on 23 June 2016 reported.
- Flooded from road.

1.4. Description of local drainage system

Public sewers
Deerswood Avenue is served by surface water and foul water sewers managed by Thames Water Utilities Limited (TWUL). These were not surveyed as part of this investigation, however, according to TWUL's records, a 225mm diameter sewer serves Deerswood Avenue.

The surface water sewer and foul water networks in Hatfield are the responsibility of Thames Water Utilities Ltd (TWUL). In this catchment, the sewer networks for foul water and surface water are separate. TWUL's networks must operate within the rules laid out as part of the Water Industry Act 1991.

Highway drainage
There are gullies on Deerswood Avenue to drain the highway. The connectivity of these has not been confirmed but they will connect either to the public surface water sewer or soakaways. It is not the role of highway drainage to prevent flooding to property so a more detailed understanding of the highway drainage network has not been pursued. Deerswood Avenue is on the 18 month gully clean cycle.

Any other drainage
To the east of the incident site, there is an ordinary watercourse which enters a culvert 675mm wide running from south to north, shown in Figure 3. There is also a pond area just behind the houses on Deerswood Avenue to the south in the direction of Marshmoor, as shown in Figure 4.

Figure 3 Ordinary watercourse culvert entrance

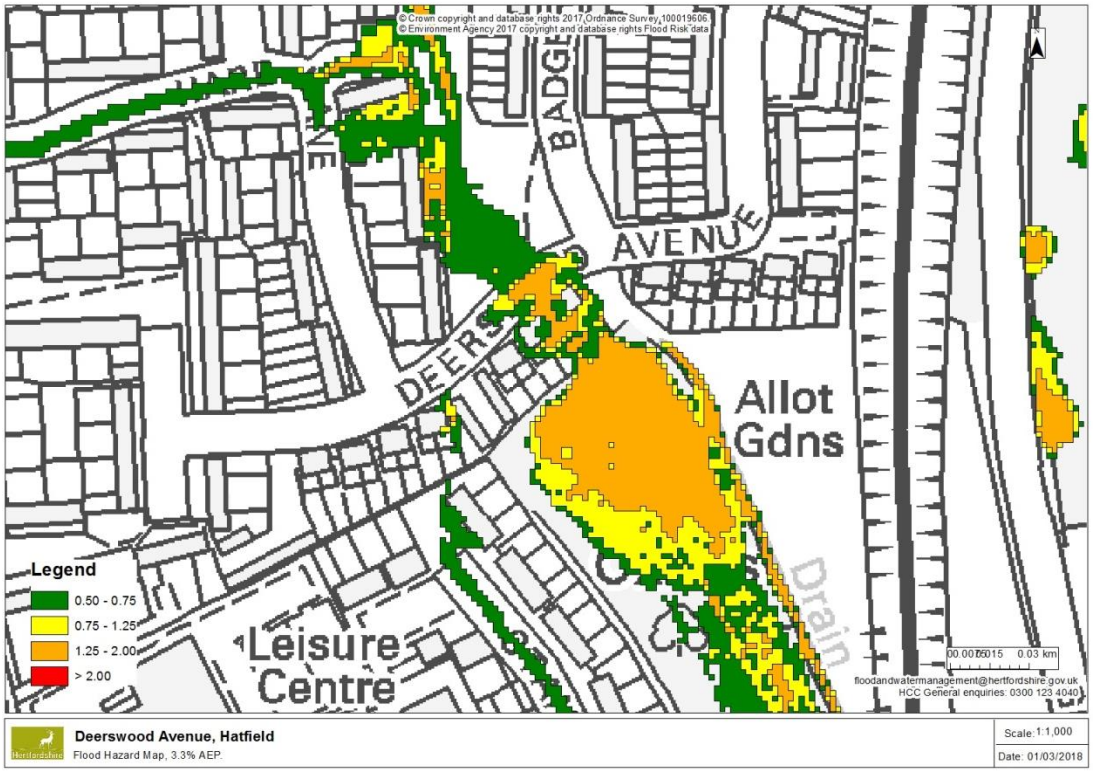
Figure 4 Pond area behind houses

1.5. Hazard map

Nationally recognised Flood Hazard Ratings have been developed by the Environment Agency as there is an acceptance that not all flood risks can be managed and there is a requirement to estimate the current risks from flooding to people, the economy and the environment. A national flood hazard rating methodology was developed with four classes in order to better and more simply highlight risk.

Property in Deerswood Avenue has been given a hazard rating of up to between 1.25 and 2.00, which is the third classification out of the four. This is further defined as a 'Significant' degree of flood risk. The classifications are Low, Moderate, Significant and Extreme. The EA describes Significant risk as deep fast flowing water posing a danger for most people. For the flood hazard map in relation to Deerswood Avenue, see Figure 5.

Figure 5 Hazard map



The calculation of flood hazard is based on a large flow of water from the south through the woods. However, it seems likely that these calculations do not take into account the effect of the ordinary watercourse in the area. The anecdotal evidence does not confirm this flow path. Instead, flooding was reported as having come from the road and not from the rear of properties.

The hazard rating is only as good as the data which it is based on and small differences in the topography data can have significant implications. The context of the flood hazard map should be considered when reading it.

2. Causes

2.1. Rainfall Analysis

There was heavy recorded rainfall on 23 June 2016. The rainfall was typical of a summer thunderstorm that swept through Hertfordshire. The hyetograph (Figure 6) shows the intensity of rain every five minutes during 23 June 2016. There was a sharp peak of rainfall of 105 mm/hr at 18:15.

The closest rain gauge to Deerswood Avenue is at Mill Green which is about three kilometres away. Thunderstorms' intensity varies greatly over short distances. Therefore, a rain gauge three kilometres away is unlikely to reflect the thunderstorm which passed over Deerswood Avenue on the 23 June 2016 at 18:15. Instead, the rainfall data shown in Figure 6 is a prediction based on measurements of the moisture content of the air using radar.

Figure 6 Rainfall intensity, 23 June 2016

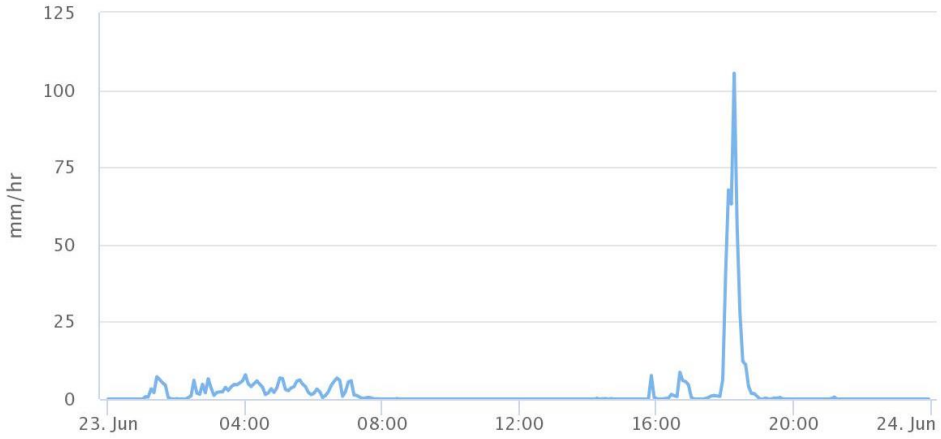
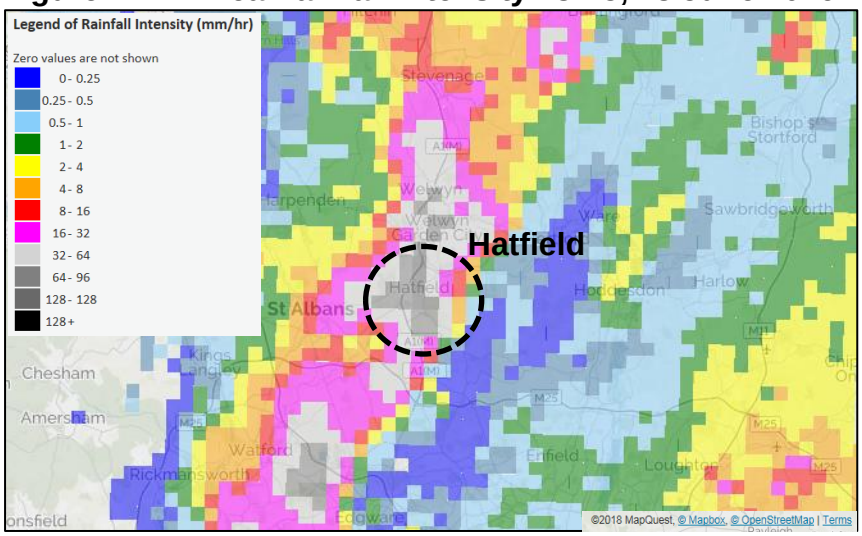


Figure 7 is a rainfall radar map of predicted rainfall across the county at 18:15 which is when the rainfall at the incident site was heaviest. It shows that the rainfall in Hatfield was estimated to be of an intensity of between 96 and 128 mm/hr.

Figure 7 Areal rainfall intensity 18:15, 23 June 2016



2.2. Assessment of local drainage systems

This assessment considers the condition and capacity of structures, such as any culverts, watercourses, highway drainage and access structures.

Public sewers
Most surface water sewer networks are not designed to manage extreme rainfall – rainfall with a return period of 1 in 20 years or above. Hence, surcharging of public surface water sewers during extreme rainfall events does not necessarily mean that there is an operational problem with the sewer, e.g. a blockage. There is not the history of flooding to indicate that the surface water sewer is not fit for purpose.

Highway drainage
Hertfordshire County Council in its capacity as the Highway Authority is responsible for draining the rainfall which falls on the highway. Highway gullies are designed to capture and drain moderate rainfall from the highway. Overland flow which enters the highway from adjacent land adds to the volumes of water that the gully network is required to drain away. Highway drainage would not be expected to cope with the rainfall event on 23 June 2016 because of its very high intensity. Even where gullies are placed to receive large volumes of water, the volume that they can discharge is limited by the outlet pipe sizes and the available capacity in the downstream network.

Any other drainage
n/a

Watercourse Conditions
There is no evidence that the ordinary watercourse at the rear of the incident site overflowed or contributed to flooding. The evidence is that flooding came from the road and not the watercourse.

2.3. Overland flow

Catchment
The flooded area is a topographical low point so surface water from the surrounding areas will flow towards the incident area.

Extent of impermeable area
Impermeable areas are where water can not soak through. All the water which falls on these areas will runoff as overland flow. Deerswood Avenue is a suburban area with lots of green spaces.

Kerbs
Dropped kerbs provide a pathway for water to exit the road. There kerbs are not dropped in the investigation area.

Road higher than receptor
The flooded properties are lower than the road, so any water running off the highway will flow towards the properties.

Threshold
The threshold of a property is the height at which water could enter. The LLFA do not have information on threshold heights.

3. Roles and Functions

3.1. Responsibilities

Part of the role of Hertfordshire County as the Lead Local Flood Authority is to identify the risk management authorities (RMAs) that have relevant flood risk management functions. Those RMAs and their relevant powers and functions are set out below.

Hertfordshire County Council as the Lead Local Flood Authority
The receptor was flooded by surface runoff. The Lead Local Flood Authority [Hertfordshire County Council] has permissive powers for managing the risk of flooding from surface runoff (under s14A of Land Drainage Act 1991).

Hertfordshire County Council as the Highway Authority
The Highway Authority maintains the parts of the road network which are highway maintainable at public expense which includes provision of drainage and also has permissive powers under the Highways Act 1980 to manage flooding of the highway.

Environment Agency
The Environment Agency has powers and a regulatory role around main rivers and also provides flood warnings in certain areas.

District Council
As well as powers of designation, Welwyn Hatfield Borough Council have permissive powers to manage flood risk from ordinary watercourses under s14A of the Land Drainage Act 1991. They lead local resilience forums when a major incident is declared, and have a flood risk management function via their role as the Local Planning Authority including the publishing of strategic flood risk assessments. Flooding as a nuisance can come under the remit of the Districts' environmental health teams.

Water and sewerage company
TWUL manages the public surface water and foul water sewer networks in this area of Hertfordshire. TWUL manages flooding from their network in line with their business plan approved by OfWAT.

TWUL, like all water and sewerage companies, are required to keep a register of all instances of internal and external flooding of properties, this is referred to as the DG5 register. This register is used as the evidence to justify improvements to the surface water network.

Only TWUL has the authority to alter the surface water sewer and to manage the flood risk associated with it.

Internal Drainage Board
There is not an internal drainage board in this area.

Riparian Landowner(s)
Check your rights and responsibilities. Hertfordshire County Council has produced a helpful leaflet which summarises riparian landowners' rights and responsibilities. https://www.hertfordshire.gov.uk/media-library/documents/environment-and-planning/water/ordinary-watercourses/service-standards/new-owc-leaflet-web-version-fv.pdf. Riparian landowners have a responsibility not to do or allow anything to unduly affect the flow of water in a watercourse which runs through their land. However, there are no watercourses in the area.

Property owners
The owners have the final responsibility for their property.

3.2. Functions exercised or proposed to be exercised

Hertfordshire County Council as the Lead Local Flood Authority

- Have carried out an investigation using its powers under Section 19 of the FWMA 2010 and written and published this report.

4. Recommendations

Hertfordshire County Council as the Lead Local Flood Authority

- Investigate the feasibility and proportionality of diversion or attenuation of runoff which would otherwise run down the highway. There is lots of open green space in the area and mostly on the downstream side of the road.
- This investigation has highlighted the importance of the role the ordinary watercourse which comes out of Oxleys Wood. The LLFA should consider increasing the frequency at which it inspects critical reaches of this watercourse. The current inspection frequency is at least once every seven years.
- Confirm the route of the ordinary watercourse culvert. The LLFA map of where the ordinary watercourse goes when it is in culvert differs from the Thames Water map's depiction (in which is recorded as a private asset). It may be important to know the route of the culvert in case any maintenance of it is required in future. The LLFA map shows the culvert as following the shortest route from the inlet to the outfall which suggests that the line was assumed. A letter sent by a resident of Primrose Close describes the stream running in culvert between Foxglove Close and Primrose Close.

Hertfordshire County Council as the Highway Authority
No recommendations.

Environment Agency
n/a

District Council
No recommendations.

Water Company
No recommendations.

Internal Drainage Board
n/a

Riparian Landowner(s)
No recommendations.

Property owners
The localised nature of the flooding in this area means it is unlikely that there will be a viable neighbourhood level scheme to reduce flood risk so increasing the flood resistance of individual at risk properties needs to be considered as an option.

Property Level Resistance (PLR) measures are appropriate where flooding is not expected to last for a prolonged period of time, water is not moving fast, and where it is generally not deeper than 600 mm. It should be noted that

measures may not completely stop the entry of flood water and may only serve to delay the time of entry.