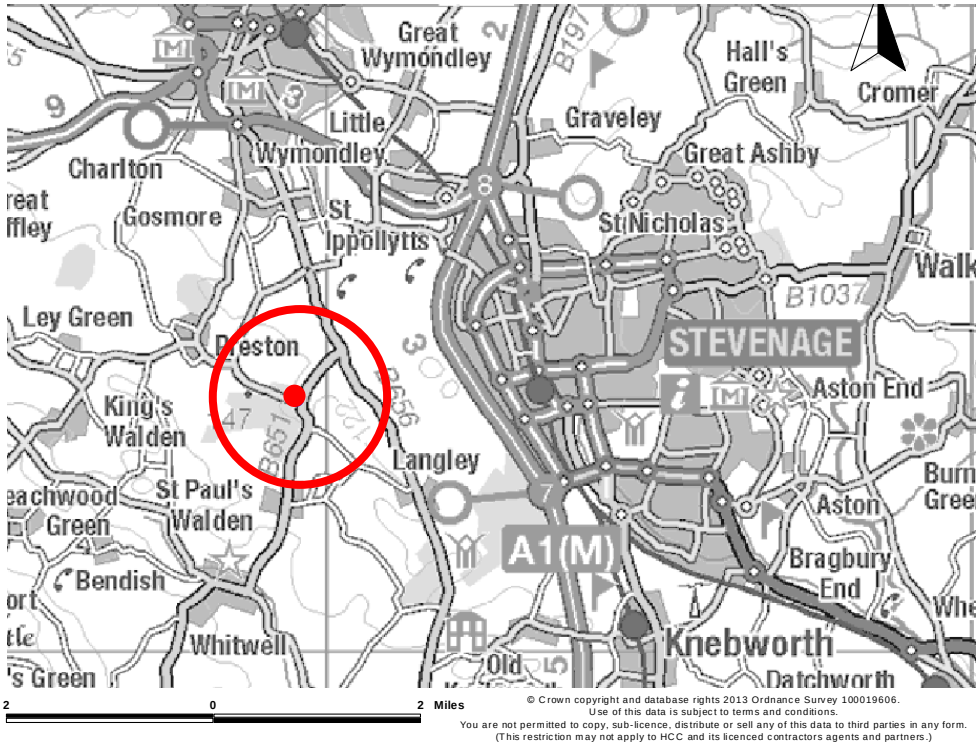
Hertfordshire County Council
Flood Investigation Report

Flooding location - Eastern end of Hitchwood Lane near Preston, Hertfordshire – TL 196 238



Summary

As required by section 19 of the Flood and Water Management Act 2010 Hertfordshire County Council as Lead Local Flood Authority on becoming aware of a flood in its area, must, to the extent that it considers it necessary or appropriate, investigate the incident and:

- **identify the Risk Management Authorities (RMAs) with relevant flood risk management functions -** *as the flooding is caused by surface water and water running along a highway the relevant RMAs are Hertfordshire County Council (as LLFA and as highway authority).*

- **establish if the relevant functions have been exercised or if it is proposed to exercise them? -** *Yes, some mitigation work has already been put in place by the highway authority. Further investigations will be carried out by the LLFA to determine feasibility of additional work.*

- **publish the report -** *Published on Hertsdirect on 27/08/2019*

- **inform the relevant Risk Management Authorities –** *the LFFA and highway authority have been involved in drafting this report*

Hertfordshire

CONTENTS

1 INTRODUCTION

The purpose of this report is to identify which of a range of organisations has powers to manage the flood risk affecting a particular area and also give an indication as to whether any management of the flood risk may take place. To be able do this, the cause of the flooding incident being investigated needs to be determined, which in turn allows the relevant risk management authority to be identified. Any further activity will be dependant on the operating procedures and priorities of the relevant risk management authority. A report produced at this point would meet the requirements under section 19 of the Flood and Water Management Act 2010 to investigate flooding and report, but in itself would not help general understanding of the flooding issues.

In this instance Hertfordshire County Council as Lead Local Flood Authority (and Highway Authority) holds the relevant permissive powers so the scope of the report has been extended to give an insight into the potential for any action to reduce the flood risk in the affected area.

1.1 Location of Investigation Site

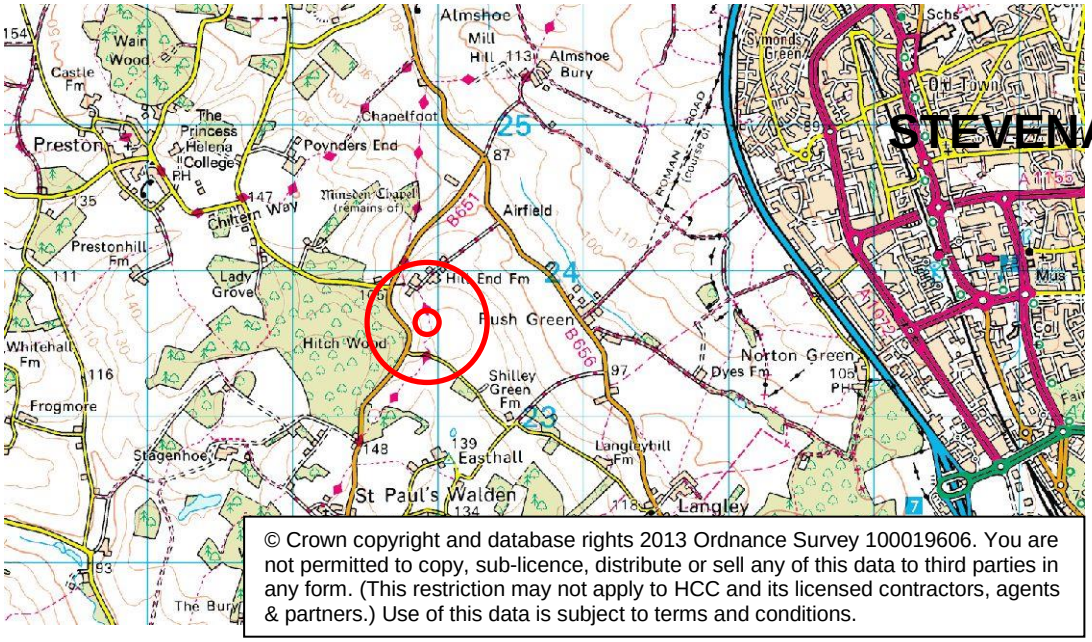
Hitchwood Lane close to the junction with the B651, approximately 1 mile to the south-east of Preston, Hertfordshire (see map 1 below).

1.2 Reason for Investigation

The flooding event meets thresholds set out in the Local Flood Risk Management Strategy for Hertfordshire 2013

- Repeated flooding effectively closing the road to the majority of vehicles and similarly restricting access to a domestic property (more than one event)
- Repeated flooding in close proximity to a dwelling (more than 10 events - see flood outlines in figure 1).

Map 1: general location of flooding site (spot circled in red)



2 SITE AND FLOODING HISTORY

2.1 Description of Flood Being Investigated

Water ponding adjacent to Hitch Wood near Preston Hertfordshire affecting road and encroaching into gateway and curtilage of dwelling. Water reaches a depth (300mm plus for a significant area and a max depth of 1100mm has been measured) and extent (60m plus) that prevents use by the majority of vehicles affecting access from the south to properties on Hitchwood Lane and the village of Preston.

Photograph 1: flooding extent 27 January 2013

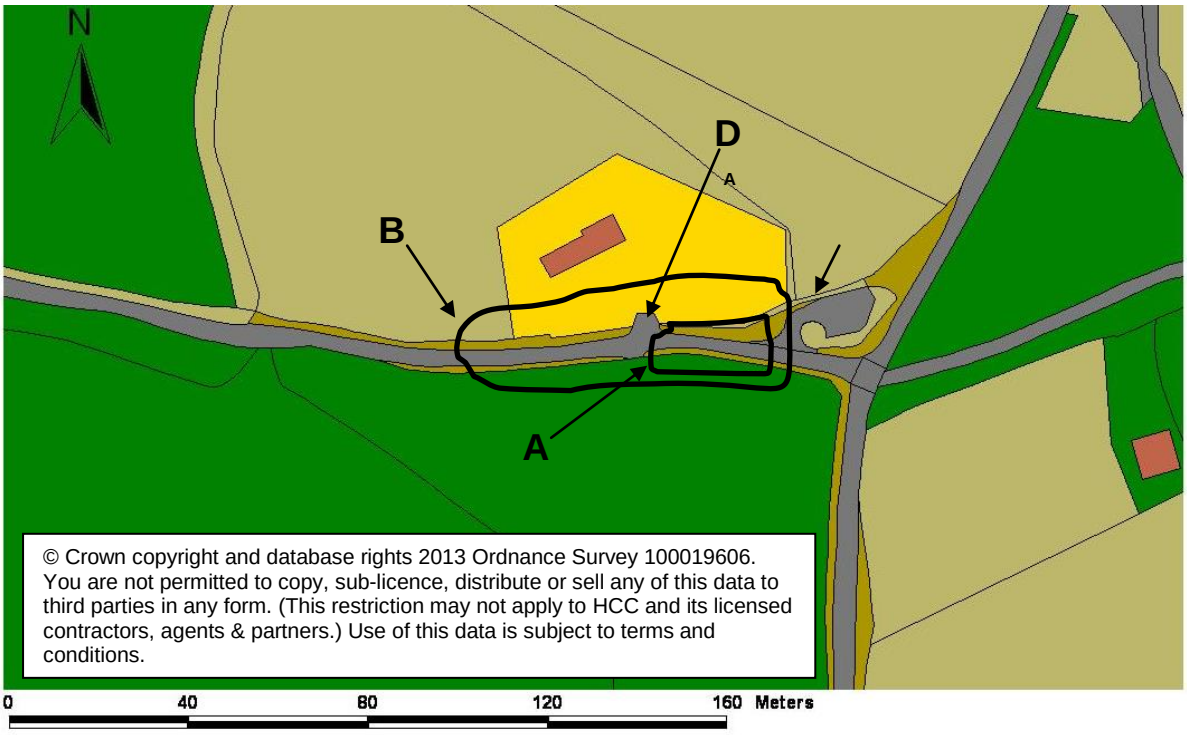
Photograph 2: flood receding, gives an indication of lowest point in road (30 January 2013)

Referring to figure 1 below, flooding to extent A was observed during site visit on 30 January 13. There are photographs of flooding to the extent B (see photographs 1 and 3). Photograph 2 taken on the day of the site visit gives an indication of the lowest area on the site. At this extent the flooding is 250mm deep at some points along the road.

During an event as the area of flooding develops the initial stages will largely be confined between the highway verges and ditches on the south side of the road, but will also extend up the driveway of the adjacent property (figure 1, point D). Once the verges are breached the flooding will start to extend outwards in all directions.

Although there is a wall to the north of the flooding site it is punctuated by an entrance so only contains water until the level moves up the driveway to the point that water can flow round the back of the wall. No levels were taken on the site visit but it seemed likely that the flood extent would increase until water was able to flow away in the vicinity of point C shown on figure 1. Further investigation will be necessary to determine if the inhabited property would be inundated before the flooded area started to overflow northwards.

Figure 1 plan showing approximate flood extent



2.2 Property Damage and Other Impacts

- Obstruction of access to property
- Damage to electric gate opening mechanism
- Flooding within curtilage of property
- Water damage to boundary wall
- Effective obstruction of highway to the majority of vehicles (alternative routes are available to access the far end of Hitchwood Lane but this requires diversion of at least 2 miles)
- Damage to cars as a result of people driving into flood water (the advice from a range of sources is not to drive into flood water unless you are sure of the depth)

2.3 Previous Flood Events

Similar event reported in June 2012 (emails and photos from resident and newspaper article about stranded car).

Brief discussions with local passing motorists at the time of the site visit indicated that flooding at this point was not confined to the exceptional conditions of this year, a fact born out by the presence of permanent flood warning signs either side of the observed flood pond.

There are anecdotal accounts of repeated depths of flooding at this point over a period of at least 25 years.

Table 1 below summarises the information held on the Hertfordshire County Council highways fault reporting database from 2001 until present. This may not be a definitive record but nonetheless supports the anecdotal accounts that there is a history of flooding at the site.

Table 1 reports of road flooding to Hertfordshire County Council

Report		Duration	Entry
2013			
14 February	Flooding affecting road		Officer
27 January	Flooding affecting road		ePortal
2012			
20 December	Flooding affecting road		ePortal
11 June	Flooding affecting road		Officer
29 April	Flooding affecting road		Officer
2011			
18 January	Flooding affecting road		Hertsdirect
2010			
04 May	Flooding affecting road		Hertsdirect
25 March	Flooding affecting road	Days	Hertsdirect
25 February	Flooding affecting road	Months?	Hertsdirect
2009			
17 December	Flooding affecting road		Hertsdirect
30 November	Flooding affecting road		Hertsdirect
27 August	Flooding affecting road	Ongoing	Officer
10 February	Flooding affecting road		Officer
23 January	Flooding affecting road (300mm)		Officer
2007			
10 January	Flooding affecting road		Officer
2006			
24 October	Flooding affecting road		Officer
2004			
10 August	Flooding affecting road		Officer

When “flooding” is reported in the highways system this can cover anything from essentially a deep puddle across the road to a significant depth and extent of water

affecting the highway and adjacent areas. An observation from a local resident at puts some of the entries in Table 1 above into context:

"There was not one day between December 2008 (when we moved in) and Spring 2011 when the road was impassable despite significant and prolonged rainfall for periods during that time. There was [sic] of course periods where there was a large puddle which was inconvenient but the water did not flood into our grounds or threaten our house even in the most torrential and prolonged rain"

Table 2 flood events notified by nearby property owner

Date	Comments
27 January 2013	No access after one night of rain
1 and 2 January 2013	
3rd week in December 2012	
26 and 27 November 2012	
March/April 2012	Road impassable for 2 weeks
14 February 2012	Flooded but still able to gain access to property

Flooding is felt to be have been generally worse since 2011.

Photograph 3 Hitchwood Lane flooding 10 /11 June 2012

2.4 Description of Local Drainage System

No public sewers, no highway drains, some gullies, presumed to drain to soakaways under road.

2.4.1 Culvert Conditions

Not applicable

2.4.2 Open watercourse conditions

Not applicable

2.4.3 Access Structures

Not applicable

2.4.4 Systems at capacity

HCC Highways have installed some drainage in the affected area. Water runs from the highway into ditches in the adjacent woodland which are in turn connected to a series of four linked soakaways under the carriageway. At the time of the site visit (30 January 2013) these were full.

There is potential for significant amounts of silt to be washed into the drainage ditches and soakaways. Local resident observed that efficacy of soakaways improved after they were jetted.

2.5 Flood Alleviation Scheme Status

No schemes identified.

2.6 Site History

Within the same period of the flood events listed in table 1 there have been changes which have had implications for the flood risk in this area.

Locally a property has been converted from agricultural use to a dwelling at some point after 2005. The barn surroundings and roadside boundary features were also changed, including the construction of a wall (see photograph 1).

Following the conversion to a dwelling, a pond was constructed within the curtilage (solid red circle gives approximate location). Water was able to drain from the highway into the grounds along a grip in the highway verge which was directed between the boundary wall and adjacent bund (solid red arrow in figure 2 below). No levelled plans are available and it is assumed that some water would have flowed away from the area of flooding along the grip into the garden where it would disperse, including some infiltration into the pond. However the current owner never observed that happening which suggests it would only happen under extreme conditions. At the time this report was drafted there were some images on Google “Streetview” showing the grip and pond but copyright restrictions do not allow them to be used in this report.

Figure 2 annotated extract from 2010 aerial photography

There was further landscaping of the garden area in January 2010 including infill of the pond, alteration of levels and re-profiling of the bund in the north–east corner of the property to make it contiguous with the property's boundary wall.

Soakaways under road fed by ditches in the adjacent verge to the south were installed by Herts Highways during 2010 and are indicated in blue in figure 2 above. (There was evidence of fresh excavation of the ditches seen on site visit 29 January 2013).

2.7 Rainfall Analysis

Because of the history of flooding at the site an analysis of any relevant rain gauge data was not felt necessary for this report as the record of events in table 1 gives an adequate understanding of the potential frequency of flooding events.

Saturated ground conditions will have been a contributory factor to the more recent events in that water will have run off into the area more quickly and in greater quantities relative to the amount of rainfall. In addition, water levels will have been slower to recede due to a reduced capacity for infiltration. The Environment Agency monthly water situation report for Anglian Region (Central Area) for the period dated December 2012 gives an insight into the prevailing conditions

Rainfall current month – 172mm (notably high), Last 3 months - 172 mm (exceptionally high), Last 6 months – 147mm (notably high), Last 12 months 134 mm (exceptionally high) Soil moisture deficit as of 1st January 2013 0-10% (saturated)

3.0 ANALYSIS OF FLOODING

3.1 Flooding Mechanism

Ponding of overland flow, which remains until the area drains through natural infiltration and a series of linked soakaways

3.2 Problem Observed on Site Visit

To the north and west of the area affected, water flows off adjacent farmland and woodland into Hitchwood Lane (for a distance of c 1 km) and follows the line of the road, until it reaches a point circa 30m from its junction with the B651 (White Lane/ Hitchin Road); this is a natural low point and it ponds here. On the day of the site visit it was up to 250mm deep. There is potential for additional flow from the south overland through Hitch Wood and possibly some flow from the east over the B651 and then down the short section of Hitchwood Lane to the area of ponding. The catchment contributing the flows to the flooding area is in the order of 2 to 3km^2 (figure 3 below). Land use is mostly woodland with some pasture and dwellings. Hitchwood Lane acts as a natural flood route. The fields / woodland either side are up to, and in cases, more than 1 metre higher.

Photograph 4 view looking down Hitchwood Lane toward flooding site showing roadside banks

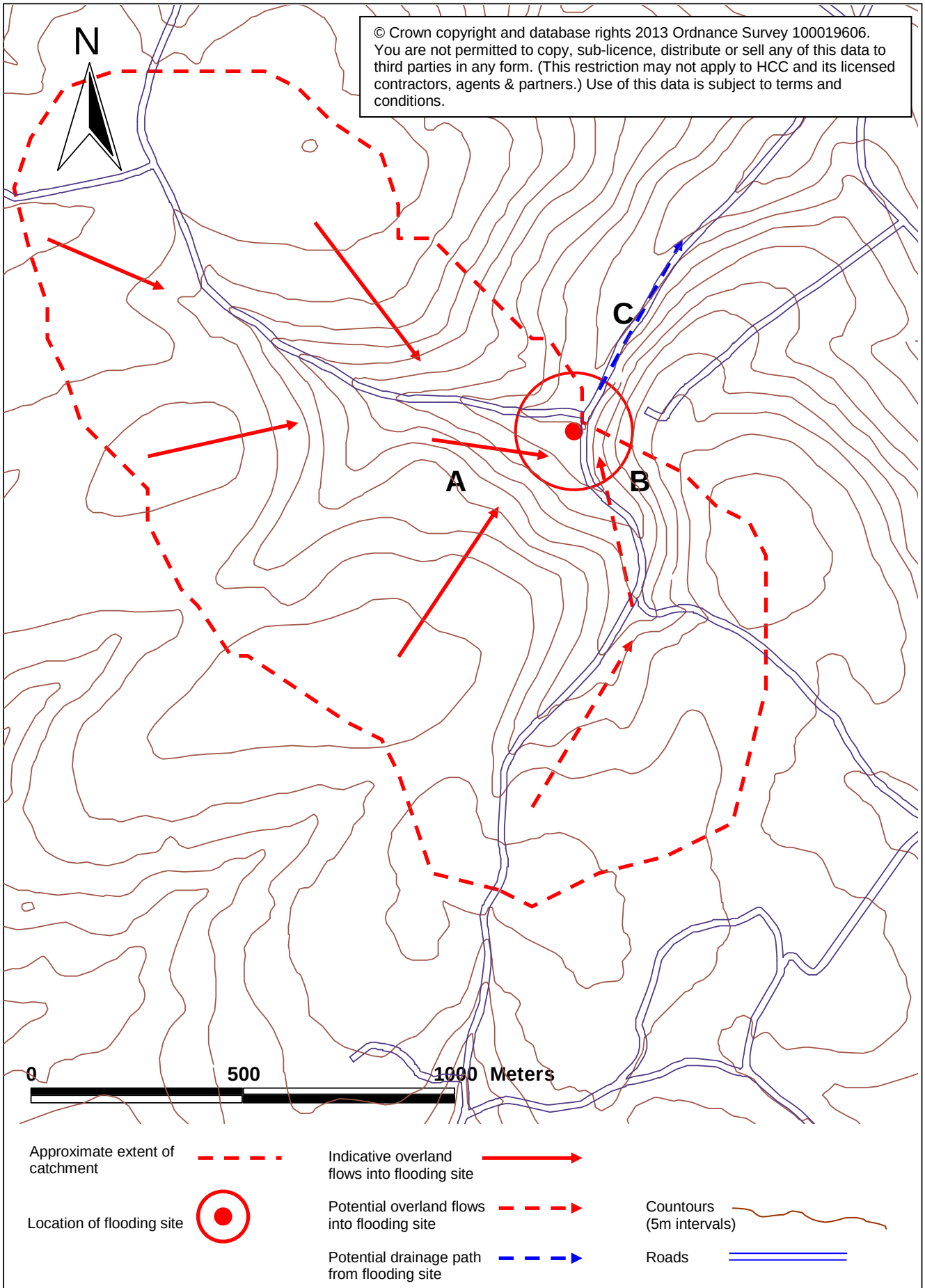


Figure 3 indicative diagram of potential flows into flooding site

Given the generally saturated ground conditions it is likely that any soakaways in this area are full. The water level in ditch-like structures in the woodland was contiguous with the water level in the road.

The flooding events in July 2012 and Jan 2013 have coincided with a record period of rainfall (wettest year recorded in England). The saturated ground conditions stemming from this rainfall are likely to have contributed to the impact on flooding of intense rainfall in July and heavy rain causing lying snow to melt in Jan. These events have not been quantified. It may be possible to obtain rain gauge records to get some insight into the rainfall for the July 2013 event.

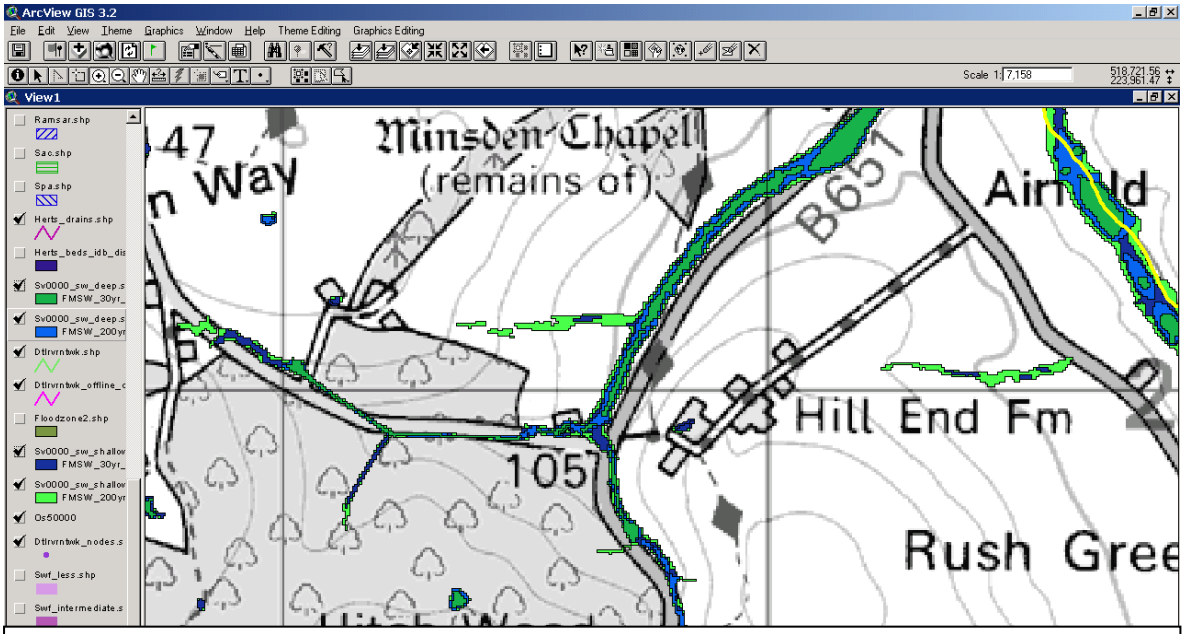
3.3 Modelling of Flood Risk - Flood Map for Surface Water / Areas Susceptible to Surface Water Flooding

The best available modelled surface water flood maps (figure 4 below) generally support the described flooding mechanism, in that they predict a flood route running downhill, parallel to Hitchwood Lane, towards the general vicinity of the observed flooding. The modelling also predicts that water will naturally flow North / North-east from the flooded area however there is no natural flow path from the area of ponding to lower lying areas of land to the north.

Flows from the B651 into the area of flooding have not been observed.

NB this modelling was carried out at a national scale and should only be displayed on a 1:50,000 mapping base. It is indicative of areas where there is potential for surface water flooding and should not be used to prescribe the flood risk for individual properties. The data is indicative and should be used as a guide to where more detailed investigation is worthwhile.

Figure 4 – screen shot of Flood Map for Surface Water (FMfSW) 30 and 200 year deep and shallow layers



4. ROLES & RESPONSIBILITIES

Explanation of specific roles and responsibilities relevant to this event

4.1 Lead Local Flood Authority Role & Responsibility

Herts County Council has to investigate flooding to the extent that it considers necessary, effectively to determine the cause so that it can be brought to the attention on the relevant "Risk Management Authority" the investigation has to be published and must note whether the relevant RMA(s) have applied or intend to apply any permissive flood risk management powers.

The council as a county authority LLFA has permissive powers relating to the management of flood risk arising from surface water and ground water. Management includes activity to analyse, assess or reduce risk. Application of these powers has to be proportionate and risk based.

4.2 Other Risk Management Authorities Roles & Responsibilities

4.2.1 Environment Agency

Not applicable – has powers to manage flood risk from rivers but there are none involved in this area of flooding.

4.2.2 District Council

Not applicable – has powers to manage flood risk from ordinary watercourses but there are none involved in this area of flooding.

4.2.3 Internal Drainage Board

Not applicable – has powers to manage flood risk from ordinary watercourses but this area in not covered by an Internal Drainage Board.

4.2.4 Highways Authority

Herts County Council as Highway Authority has permissive powers under the Highways Act 1980, sections 100, 101, 110 or 339 powers to maintain to improve and drain highways.

- section 100 powers to drain the highway
- section 101 power to infill ditches (which may result in watercourses being put into culverts)
- section 110 powers to divert a watercourse
- section 339 clarification of consents being required by the highway authority before modifying watercourses

4.2.5 Water Company

Not applicable – no public sewers in area & no water main implication.

4.3 Individuals Roles and Responsibilities

4.3.1 Riparian Landowner(s)

Local Landowners owning land (fields & woodland – Hitch Wood) adjacent to highway have a right to allow natural drainage of their land onto adjoining land. It is not permitted to discharge water onto a highway if it crosses a footway. Riparian owners must manage any ditches, culverts and similar watercourses to maintain flow.

4.3.2 Property Owners

They should manage the flood risk to their own property by taking steps to reduce the probability of flooding and making modifications to increase resilience of their property to flooding. This might include some or all of the following approaches:

- the erection of temporary or permanent barriers to prevent water reaching buildings
- measures such as flood resistant doors, one way valves on drains and self-closing airbricks to prevent water entering buildings
- modifying electrical systems, flooring materials and wall finishes to reduce the impact of any water that enters buildings.

5. CONCLUSIONS

The flooding is believed to be caused by overland flow / seepage entering at points along the length of Hitchwood Lane and then flowing downhill across or along the road to a dip and then accumulating to form a ponded area of flooding. (There may have been some local groundwater effects this year in particular as the ground has been largely saturated for an extended period. As a result the soakaways, which were observed to be full, cannot operate which greatly reduces infiltration and drain down from the flooded area. Regular maintenance of the soakaways will help manage water levels during more frequent low level nuisance events but will not solve the issue of flooding during infrequent heavy and or prolonged rain storms.

The flooding is unlikely to be caused by a general ground water condition as the field immediately to the north of the road is at a lower level and no flooding was observed in this area.

There is no failure of infrastructure or recent construction activity that has caused the flooding. Historically there has been landscaping in the curtilage of the adjacent property; a new boundary wall, infilling of the pond and localised raising of levels. This is not the cause of the flooding but may have obstructed (and so raised the level of) the overflow route to the north from the ponded area and so caused the flooding depth to be deeper than it might have been before the most recent landscaping works.

Accounts of previous flooding at this location indicate that there is potential for this area to flood due to periods of intense or prolonged heavy rain which lead to surface runoff. For any given storm the impact will depend on seasonal condition of vegetation together with the potential for water to infiltrate which will have an impact on the volume of water reaching the site and how quickly it can disperse by infiltration.

It would need a detailed level survey to confirm if the flood water were to rise above the observed levels that it would start to flow northward before it reached a level where it would enter the ground floor of the adjacent property.

Initial observations would suggest 3 (4) possible solutions which could be further evaluated after calculation and assessment of the potential surface water flows. They are outlined below in no order of preference or priority in the following table 3.

The options for managing the situation are:

- Intercepting and diverting the overland flow before it reaches the road
- Intercepting and removing the flow after it has reached the road
- Taking the ponded water away from the road and property entrance either by creating alternative storage or infiltration in the vicinity or a flow route away from the area.
- Moving the location of the access to the property which gets impeded and, subject to a detailed survey, install any necessary property resilience measures.

Table 3: Indicative assessment of a range of potential interventions (not exclusive)

Intervention	Benefits	Constraints / costs	Assessment
1) Intercept and manage the overland flow before it reaches the road / flooding site through a series of ditches and attenuation features.	Could be achieved with features on the surface which would be more suited to a woodland environment than a piped system which might block. Retains water in the catchment.	This will require the consent of adjacent landowners as there is no room with the highway curtilage. Access / responsibility for future maintenance. Excess flows south of the road would still drain towards the flooding site.	Improbable that such an approach would be viable due to need to obtain multiple permissions and it is unlikely to have significant cost advantages when land purchase / leasing, , construction cost and ongoing maintenance are taken into account.
2) Intercept the flow along the road at 2 or 3 locations, divert the flow into soakaways to be constructed in the wood (south of the road linked to 2 or 3 road gullies).	Retains water in the catchment.	This will require the consent of the landowners here (owners of Hitch Wood). Excess flows south of the road would still drain towards the flooding site. Access / responsibility for future maintenance. Will not function if gullies block (due to leaves).	Although viability would rest on securing necessary interest in land to construct and maintain soakaways, a practical concern would be the risk of failure due to the system blocking. Is unlikely to have significant cost advantages when land purchase / leasing, construction cost and ongoing maintenance are taken into account.

Intervention	Benefits	Constraints / costs	Assessment
3) At the low point construct 1 gully in the highway, pipe the water to a soakaway to be located in land due east of the boundary of residential property (north of the road, adjacent to a lay-by). (Alternatively if levels permit rather than construct a new gully construct an outfall from the existing soakaways – this would help overcome the potential for a gully in the road to block).	Water would still flow away from the area of flooding even if there was high groundwater.	This will require the cooperation of the relevant landowner.	Although it will require an interest in the land this will be a relatively small area adjacent to the landholding highway boundary. Although a piped system and having the potential to block, new pipe-work could potentially be linked to the existing soakaways system. Should be comparable in costs to other potential interventions.
4) Move location of the residential entrance and take resilience measures e.g. raising the electricity supply and electric gate mechanism above the level of potential flooding.	Would maintain access and reduce the likelihood of future external damage during flooding incidents.	Moving the entrance would require extensive reconfiguration of the boundary and garden of the property. Would be subject to necessary highway and planning permissions.	Within the control of property owner and could be relatively easily achieved. This would not relieve the situation on the road.

6. RECOMMENDATIONS

That an assessment of the catchment is commissioned, to determine the potential volume and rate of influx of water into the area of flooding for a range of relevant rainfall scenarios. This should include surveying the area in the vicinity of the flooding to determine the overflow flood route and could also be used to assess if any nearby buildings would be likely to flood before the water reached the “overflow” level.

(The assessment would inform the determination of the feasibility of further proposals such as option 3 in the above table).

6.1 Potential Outcomes

The viability of any scheme would depend on the availability of funding. Calculation of grant funding through the national flood and coastal erosion partnership funding is largely driven by actual or potential property damage due to flooding and awards funding on the basis of prevention of damage to property rather than against indirect and less tangible costs of flooding and there is unlikely to be any contributions from this source. Any funding for a project in this area would have to come from local sources.

The LLFA is required to act consistently with the National Flood and Coastal Risk Management Strategy for England. The broad principles are that flood risk management should be proportionate and risk based, the community should be involved in decision making and beneficiaries should be encouraged and enabled to invest in intervention measures. Public investment should be subject to a cost benefit appraisal and there are few unavoidable tangible costs associated with this flooding site. The impact on everyday living and inconvenience is recognised but it is difficult to make a financial case applying conventional cost models.

There may be some funding available through highways budgets. Candidate schemes are subject to a countywide assessment and prioritisation as part of the Integrated Works Programme.