

FLOOD INVESTIGATION REPORT

Investigation Ref:	37
Location:	Whitwick
Date of Flooding:	15th June 2016

STATUTORY CONTEXT

Section 19 of the Flood and Water Management Act 2010 (FWMA) states that, on becoming aware of a flood which meets certain predetermined criteria, the Lead Local Flood Authority (LLFA) must, to the extent it considers necessary or appropriate, undertake a flood investigation. This investigation should determine the relevant flood risk management authorities (RMAs) involved, their functions and whether the RMAs have exercised or propose to exercise those functions. The LLFA must publish the findings and notify the RMAs.

LEICESTERSHIRE'S FLOOD INVESTIGATION CRITERIA

Mandatory	
Loss of life or serious injury	<input type="checkbox"/>
Critical infrastructure flooded or nearly flooded from unknown or multiple sources	<input type="checkbox"/>
Internal property flooding from unknown or multiple sources	<input checked="" type="checkbox"/>
Discretionary	
A number of properties have been flooded or nearly flooded	<input type="checkbox"/>
Other infrastructure flooded	<input type="checkbox"/>
Repeated instances	<input type="checkbox"/>
Investigation requested	<input type="checkbox"/>
Risk to health (foul water)	<input type="checkbox"/>
Environmental or ecologically important site affected	<input type="checkbox"/>
Depth/area/velocity of flooding a cause for concern	<input type="checkbox"/>

SUMMARY OF IMPACTS AND FINDINGS

Source(s) of flooding

Ordinary Watercourse	Main River	Surface Water	Groundwater	Public Sewer	Canal	Land Drainage	Highway Drainage
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Impact (number)

Residential	Business	Other Buildings	Roads	Critical Infrastructure
3			Approx. 8	

RISK MANAGEMENT AUTHORITIES (RMAs)

The following RMAs were identified as relevant to the flooding incident:

- Leicestershire County Council (LCC) – Lead Local Flood Authority.
- Leicestershire County Council (LCC)– Local Highway Authority.
- Severn Trent Water Ltd (STW) – Statutory undertaker for wastewater in Whitwick.

FINDINGS OF INVESTIGATION

1. DETAILS OF FLOOD EVENT

On the 15th June 2016, three residential properties in Whitwick village were internally flooded at two locations. The flooding was predominantly caused by a high intensity localised rainfall event which fell over a short period of time (approximately 43.6mm of rain fell within a two-hour period, source: Mt St Bernard's Rain Gauge – located approximately 2km east of Whitwick). One location anecdotally reported flooding due to overland surface water flows from adjacent fields causing water ingress to the back of residential properties, which then flowed through to the front of the residential properties onto the adjacent highway. The second location anecdotally reported surface water flowing from adjacent fields on to the highway. The surface water then used the highway as a conduit, overwhelming the capacity of the local highway networks, and followed the natural land levels before entering the front of one residential property.

On the same date, the Environment Agency identified internal flooding to ten residential and commercial properties from Main River flooding (Grace Dieu Brook). The impact of this flooding has not been further considered as part of this report.

2. LOCATION AND SETTING

Whitwick is situated approximately 18 km to the north-west of Leicester, adjacent to the town of Coalville, in the district of North West Leicestershire (refer to Figure 1). The centre of Whitwick is situated in a valley, with land to the north and east of the village having particularly high elevation. Figure 1 illustrates the two areas (Sections 'a' and 'b') that were affected on the 15th June 2016 (excluding the affected highways and properties affected by the Main River flooding).

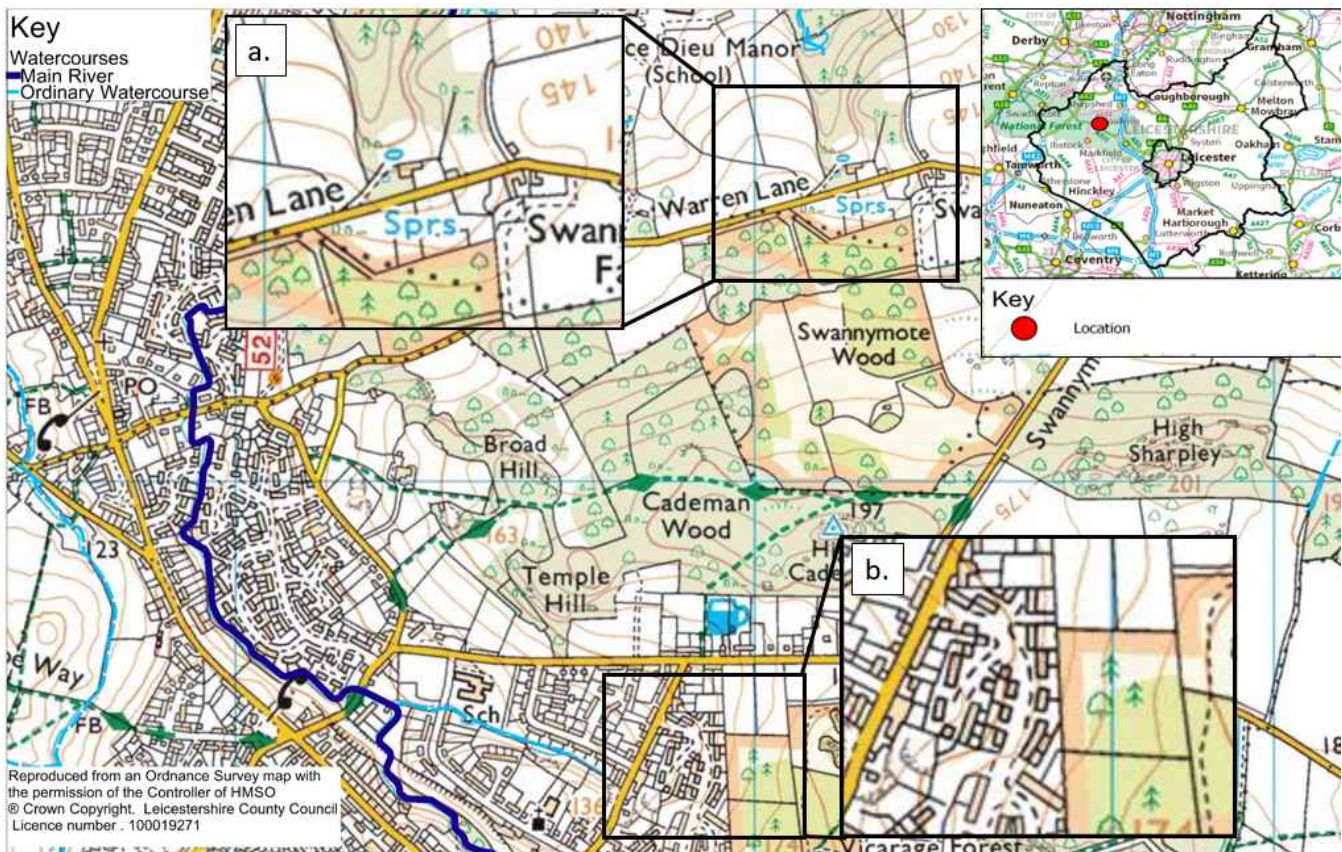


Figure 1:
Location Plan

1:2200 @ A4 Landscape
16/11/2020

3. LOCAL DRAINAGE

The two focus areas for this report are Warren Lane and King Richards Hill, (Figure 1, sections 'a' and 'b' respectively) as these were the two locations which reported internal residential flooding during the flood event (excluding those affected by the Main River flooding). Figure 1 presents a network of watercourses which run through Whitwick, however these are not within close proximity to the affected areas. The village is predominantly served by extensive combined and surface water sewer networks, maintained by STW.

Section 'a' – Warren Lane

Approximately 250m north (downstream) of the focus area (section 'a' in Figure 1), an unnamed ordinary watercourse flows in a northerly direction. Figure 1 also illustrates springs upstream of the affected residential property, but it does not identify any other watercourses in the vicinity. Along Warren Lane, there are no recorded STW assets, however there are numerous highway gullies located outside of the affected residential property.

Section 'b' – King Richard's Hill

King Richard's Hill is located on a steep gradient with the land behind the residential properties, to the east, significantly increasing in altitude by approximately 50m in 250m. The focus area has a 225m diameter surface water sewer system that runs south down the highway to the front of the residential properties. The system joins with three other surface water systems before flowing north through a 1080mm surface water system which feeds into a combined sewer system. This combined sewer system flows north and eventually discharges into the Grace Dieu Brook.

4. SUMMARY OF EVIDENCE/FINDINGS

4.1. Prior to Flood Event

The Council does hold records relating to previous flood events in Whitwick, however no formal flood investigation was conducted by the Council prior to the 2016 flood event. This is because previous flood events in Whitwick have either occurred prior to the Council being designated as the LLFA, or the event not triggering a formal investigation due to no reports of internal flooding to residential or business properties. Although Whitwick has previously experienced flooding, the impacted residential property along Warren Lane had not reported internal flooding prior to the 15th June 2016, and the impacted residential properties along King Richard's Hill reported one previous internal flooding event well over 20 years before.

According to Hydrological Summaries produced by the Centre of Ecology and Hydrology for June 2016, the month was dominated by unsettled conditions with localised thundery showers and substantial rainfall. Between 11th and 16th June 2016, there were significant downpours leading to several reports of surface water flooding across the UK.

Prior to the flood event, weather warnings from the Flood Forecasting Centre (FFC) were raised on Tuesday 14th June 2016, and the Council received a 'yellow' flood guidance statement. Following this, a Flood Warning was issued by the Environment Agency at 17:34pm on 15th June 2016 following a second significant rise in water levels due to further localised intense rainfall. After the raised flood warning, North West Leicestershire District Council distributed sandbags to residents concerned about the safety of their properties. As the affected residential properties discussed in this report were not impacted by Main River flooding, this warning would have provided no benefit to the residents.

4.2. Flood Event – 15th June 2016

On the 15th June 2016 the Mount St Bernard's rain gauge (the closest available rain gauge to Whitwick) recorded that rainfall during the event was equivalent to a 1 in 48-year storm, with 43.6mm of rain falling within a two-hour period. Prior to this, over the 12-hour period between the 14th and 15th of June, 60mm of rainfall was also recorded. These records illustrate that Whitwick was subject to an intense and discrete local cloud burst on the 15th June 2016. The flood water was anecdotally reported as 'flashy' in nature following a second intense rainfall event during the afternoon of 15th June 2016. Due to the successive rainfall prior to the event, the fields around Whitwick were already saturated, resulting in low infiltration rates and increased overland flows.

As the two focus areas were flooded by different mechanisms, they are discussed below independently.

Section 'a' – Warren Lane

An anecdotal report from a residential property on Warren Lane described overland surface water from the fields surrounding the residential properties, flowing onto the highway and using it as a conduit to travel towards the residential property. The volume and speed of the surface water, along with the low kerbing of the highway and the water following the natural lie of the land, resulted in water ingress to the front of at least one residential property. It was anecdotally reported that internal flood water levels reached up to 30cm within the residential property.

Section 'b' – King Richards Hill

Anecdotal reports from impacted residential properties along King Richard's Hill described overland surface water flows flowing in a westerly direction from the fields and woodland adjacent to the residential properties. Due to the steep topography of the land that the residential properties are located on, surface water was anecdotally reported to enter through the back of the residential properties and flow onto the highway at the front of the residential properties.

Eight highways in Whitwick were also anecdotally reported to have flooded on 15th June 2016;

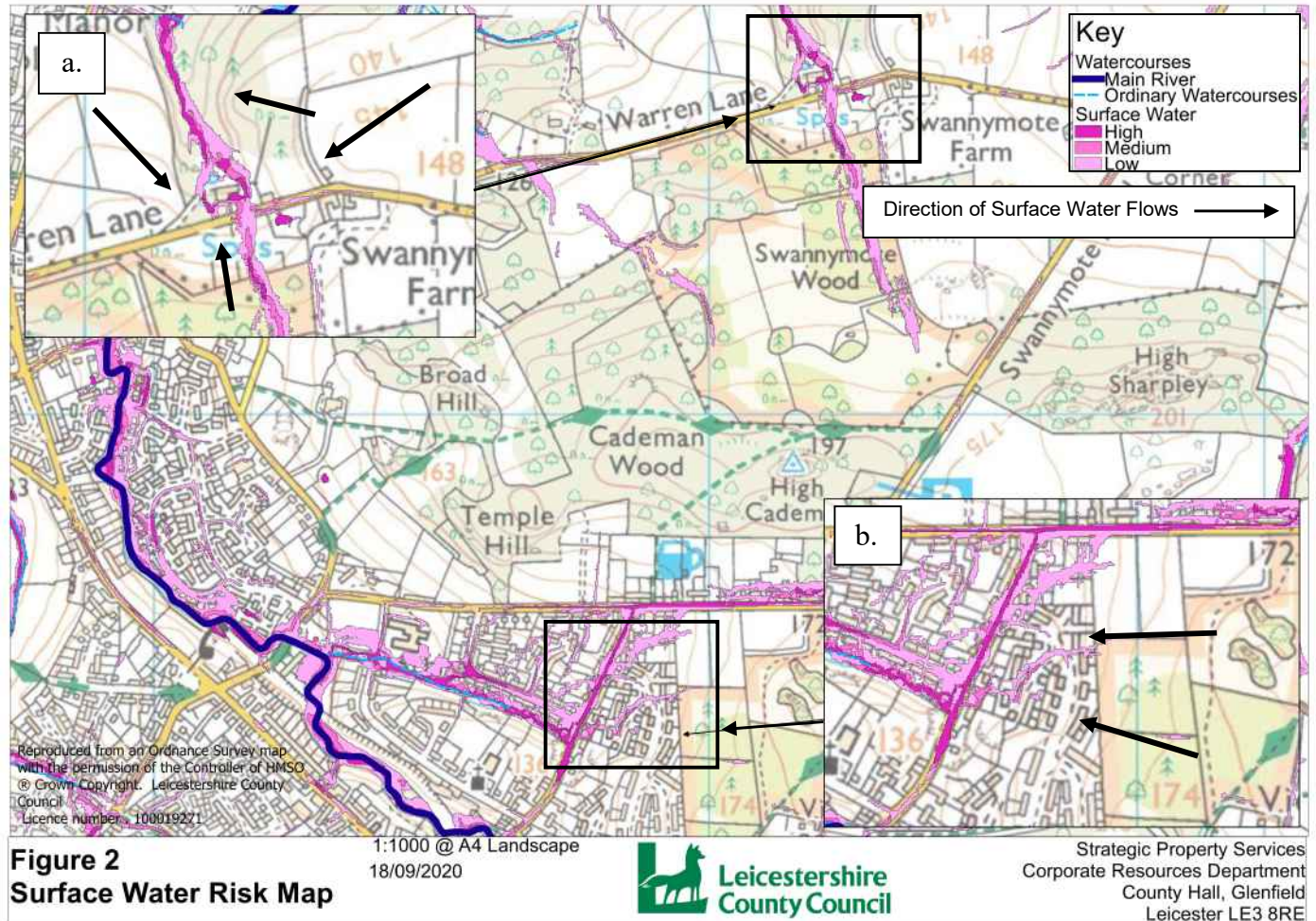
- Lees Crescent
- Cademan Street
- Loughborough Road
- Thornborough Road
- Hogarth Road
- Leicester Road
- Warren Lane
- Temple Hill

The predominant cause of highway flooding was the high volume of surface water, from the intense rainfall event, exceeding the design capacity of the drainage systems.

4.3. Post Flood Event

Following the incident, the Council held a flood recovery surgery and distributed questionnaires to local residents. Follow up letters to residential and business properties within the impacted areas were sent with information on what steps to next take, who to contact, and other useful advice. Anecdotal evidence was also collected through engagement with local stakeholders, RMAs, from various site visits and from desktop studies.

Figure 2 illustrates the Risk of Flooding from Surface Water for the study area. This data was produced by the Environment Agency and is created using high level modelling which replicates where water would fall during certain rainfall events. The risk levels for sections 'a' and 'b' are discussed in greater detail below. The closely packed contour lines on Figure 2 illustrate that Whitwick is surrounded by steep sided land and is therefore likely to be susceptible to fast flowing routes of surface water run off during a rainfall event.



Section 'a' – Warren Lane

The intense rainfall event on the 15th June 2016, and the prolonged rainfall prior to the event, would have increased the overland surface water flow from adjacent fields. This surface water would have followed the land levels and subsequently flooded onto the highway. The affected residential property is situated at a natural low topographic point adjacent to a steep sided valley.

Figure 2 illustrates that there is a surface water flow path passing through the impacted area. As part of the investigation following the flood event, an unmarked (not visible on any mapping available to the Council) unnamed ordinary watercourse was identified within the focus area. This watercourse passes through a culvert, for approximately 50m, underneath Warren Lane and a residential property (in close proximity to the affected residential property). This unnamed ordinary watercourse becomes open channel upstream of the highway (illustrated as springs on Figure 1), approximately 30m north of the residential properties. This ordinary watercourse closely follows the alignment of the surface water flow path displayed in Figure 2. It is understood that the highway gullies in this area are connected to this culverted watercourse.

During the event, this unnamed ordinary watercourse would have increased in volume following the intense rainfall and overland surface water flows. Subsequently, its capacity, and that of the highway gullies, would have likely decreased and exacerbated the volume of surface water on the highway.

The source of this unnamed ordinary watercourse is believed to be from a local spring. Within the focus area there are two springs, as well as two ponds, situated within approximately 60m of the impacted residential property. The geology of the focus area and its adjacent fields is also found to be predominantly sandstone, which has relatively high porosity and the ability to hold water well. These factors link together to indicate that the area has a natural high water-table. Following the prolonged rainfall prior to the event (discussed in Section 4.2) it can be concluded that the water table would have been high prior to the event. This would have contributed to reduced infiltration capacity of the focus area's catchment, increasing the volume of surface water overland flows.

As well as the data presenting the extents of surface water flood risk, the Council also have access to depth risk data associated with the surface water flood risk of an area. The map indicates that to the north of the impacted residential property, there is a risk of surface water reaching over 900mm, which is categorised as high risk¹.

This would indicate a significant low point adjacent to the impacted residential property, thus being the likely explanation of the surface water ingress to the front of the residential property. Although this analysis is indicative of what may have occurred during the flood event, it is important to consider that the output may not be 100% accurate due to the high-level modelling².

Section 'b' – King Richard's Hill

Although there is no direct surface water flow path identified in Figure 2 which impacts the residential properties on King Richard's Hill, the steep topography to the east of the residential properties would have likely caused significant overland flows following the intense rainfalls. The geology of the land adjacent to King Richard's Hill is mudstone which although is porous, has low permeability. Therefore, infiltration rates would likely be low, subsequently increasing overland surface water flows. This is supported by site visits conducted and anecdotal reports received. The sheer volume and speed of surface water was anecdotally reported to ingress to the back of the residential properties. The surface water then followed the topography of the land and flowed through the residential properties towards the highway to the front of the residential properties.

Since the flood event, a Community Crisis Team has been established in the village. They have distributed their contact number to community members for further guidance and help during a flood event.

The evidence collected post-flood event indicates that more residential properties in Whitwick were impacted by the flood event than addressed in this report. However, these residential properties were not investigated due to a lack of firm evidence and information available.

¹ <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>

² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/842485/What-is-the-Risk-of-Flooding-from-Surface-Water-Map.pdf

5. EXPLANATION OF FINDINGS

A review of the evidence indicates the following factors contributed to the overall flooding reported in Whitwick on 15th June 2016;

- Intense rainfall prior to the event resulted in the catchment becoming saturated, decreasing the catchment's infiltration rates and subsequently increasing overland flows.
- On 15th June 2016, there was an intense rainfall event, with 43.6mm falling in under two hours, increasing surface water flow along the village's highways as well as on adjacent fields.
- The excess of surface water exceeded the designed capacity of the highway and STW surface water systems, leading to surcharging of the drainage systems all around Whitwick.
- The three residential properties affected were situated at a natural low point compared to surrounding land.

In addition to the above, the condition of the highway gullies and the culverted section of the unnamed ordinary watercourse may have contributed towards the extent of the flood event at Warren Lane (Section 'a') but would have unlikely caused the internal flooding.

The Council has received anecdotal information that approximately 15 years prior to the flood event the National Forest Tender Scheme worked to convert land into woodland upland of the affected residential properties at King Richards Hill. The Forestry Commission and National Forest have indicated that Vicarage Wood, east of King Richards Hill, was planted by a private landowner under the Scheme. Although afforestation is known to reduce overland surface water flows, the age of the scheme would have meant that the likelihood of flood management being an objective of the scheme would have been low, but it may have provided some benefit during the flood event.

RECOMMENDATIONS AND ACTIONS

Leicestershire County Council – Local Highways Authority

- A range of routine highway maintenance work has been completed at Warren Lane since 2016.
- The Council is to review the frequency of maintenance at Warren Lane and consider raising the priority (if considered appropriate).

Leicestershire County Council – Lead Local Flood Authority

- Guidance notes have been issued to all affected residents to help those affected improve their resilience to flooding.

Affected residents/Local Community

- Local residents and tenants who are aware that they are at risk of flooding should take action to ensure that their properties are protected. Community resilience is important in providing information and support to each other if flooding is anticipated. Actions taken can include; signing up to Flood Warning Direct (if available), nominating a community flood warden, producing a community flood plan, implementing property level protection and moving valuable items to higher ground. More permanent measures are also possible such as; installing floodgates, raising electrical sockets, and fitting non-return valves on pipes.

DISCLAIMER

This report has been prepared pursuant to the Council's statutory responsibility, under the FWMA, to investigate flood incidents in its area. The statutory duty to investigate is not absolute or exhaustive. Under Section 19 of FWMA, the Council's statutory responsibility is limited to conducting investigations only to the extent the Council deems it necessary.

Where the Council deems it necessary to conduct an investigation, it is required to address two questions under 19(1) of the FWMA. Firstly, the Council is required to identify relevant "Risk Management Authorities"³. Secondly the Council is required to investigate whether the Risk Management Authorities have exercised, or are proposing to exercise, flood risk management functions set out under Section 4 of FWMA.

The relevant flood risk management authorities identified by the Council are defined in this report. The flood risk management functions which the Risk Management Authorities are proposing are also described in the body of this report.

Beyond discharging the specific statutory responsibilities under Section 19(1) of FWMA, the intended purpose of this report is solely as a resource to assist Risk Management Authorities and stakeholders to better understand the relevant flooding incident and to mitigate risks going forward.

Although the Council has commented upon contextual issues related to the flood event, it is not the purpose of this report to determine any private rights arising from the flood event.

Nor is the purpose of this report to reach conclusions as to whether any Risk Management Authority or other stakeholder (e.g. private land owners, public bodies or government agencies) has breached any duty of care (whether statutory or common law) that they may have held.

The Council has, in good faith, sought to locate and collate relevant primary and secondary evidence to prepare this report. However, the Council accepts no responsibility for assumptions or statements made on the basis of evidence which incomplete, inaccurate or both. As such, this report should not be considered as a definitive assessment of all factors that may have triggered or contributed to the flood event.

The Council expressly disclaims responsibility for any error, omission or negligent misstatement in this report to the fullest extent permissible in law. Further the Council does not accept any liability for the use of this report or its contents by any third party. Where any party wishes to assert any rights or cause of action related to the flooding event they are requested to rely on their own investigations.

³ As defined by Section 6(13) of FWMA