Flood Investigation Report

Breedon on the Hill – 15th June 2016

Final Report

NOVEMBER 2018

To discuss this report, please contact Flood Risk Management by email flooding@leics.gov.uk or by phone 01163 050 001

Contents

EXECUTIVE SUMMARY

On 15th June 2016 Breedon on the Hill was subject to an intense rainfall event which resulted in internal flooding to at least 20 residential and commercial properties as well as widespread flooding to the local highway network. The flooding was the result of an intense rainfall event that fell onto an already waterlogged catchment. The inability of the sloping ground to absorb the surface water, the rapid inundation of the local drainage network and other factors led to the ordinary watercourse breaching its banks in several places and entering properties as well as excess surface water flowing overland onto various parts of the local highway (including Main Street and Worthington Lane) which subsequently entered a number of properties.

There are a number of Risk Management Authorities (RMAs) that have relevant flood risk management responsibilities and functions within Leicestershire. Identified RMAs and other groups (including riparian landowners) should continue to work together and share information, with the aim of meeting the recommendations and actions contained herein.

Following the enactment of the Flood and Water Management Act (FWMA, 2010), Leicestershire County Council as an upper tier authority was designated as a Lead Local Flood Authority (LLFA).

Section 19 of the FWMA states that on becoming aware of a flooding incident within their area, the LLFA should investigate the event to an extent considered necessary or appropriate.

Leicestershire County Council has produced a LLFA policy which stipulates agreed criteria for undertaking Section 19 flood investigations in Leicestershire. The LLFA has deemed it necessary to carry out a formal investigation into the flood incident which occurred at Breedon on the Hill on 15th June 2016, as the incident met the criteria.

This Flood Investigation Report has been produced by the Council fulfilling duties under the FWMA as the LLFA for Leicestershire.

1. PURPOSE OF THIS REPORT

1.1. SECTION 19 INVESTIGATIONS – DUTY TO INVESTIGATE

Under Section 19 of the Flood Water Management Act 2010 (FWMA), the County Council has duties to fulfil as a result of certain flooding events. The FWMA states that:

(1) On becoming aware of a flood in its area, a LLFA must, to the extent that it considers it necessary or appropriate, investigate:

a. *which RMAs have relevant flood risk management functions, and*
b. *whether each of those RMAs has exercised, or is proposing to exercise, those functions in response to a flood event.*

(2) Where an authority carries out an investigation under section 1 (above) it must:

- *publish the results of its investigation, and*
- *notify any relevant RMAs."*

This Report has been produced by the Council fulfilling duties under the FWMA as the LLFA for Leicestershire.

1.2. LEICESTERSHIRE COUNTY COUNCIL'S LOCALLY AGREED CRITERIA FOR FORMAL FLOOD INVESTIGATIONS

Leicestershire County Council from herein referred to as *"The Council",* identified local thresholds for formally investigating flood incidents across Leicestershire within the Local Flood Risk Management Strategy published in August 2015. This policy advises when a formal flood investigation should be undertaken, including where one or more of the following occurs as a result of a flooding incident:

- Loss of life or serious injury
- Critical infrastructure flooded or nearly flooded from unknown or multiple sources
- Internal property flooding from unknown or multiple sources

In the following circumstances, discretion may be used to investigate a flooding incident where:

- A number of properties have been flooded or nearly flooded
- Other infrastructure flooded
- Repeated instances of flooding have occurred
- Investigation requested
- Risk to health (foul water)
- Environmental or ecologically important habitat has been affected
- The depth/area/velocity of flooding is a cause for concern.

1.3. FLOOD INVESTIGATION CRITERIA

A formal investigation into the flood incident at Breedon on the Hill on 15th June 2016 was undertaken as the event triggered at least one of the locally agreed flooding characteristics or discretionary items as indicated below:

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

1.4. RISK MANAGEMENT AUTHORITIES (RMAS)

The following risk management authorities were identified as relevant to the flooding at Breedon on the Hill:

- Leicestershire County Council – Lead Local Flood Authority
- Leicestershire County Council – Local Highway Authority
- North West Leicestershire District Council
- Severn Trent Water Ltd (STW)
- Highways England

2. BACKGROUND

2.1. LOCATION

Breedon on the Hill is a village and civil parish located within North West Leicestershire District Council, approximately 32 km north-west of Leicester and approximately 8 km north of Ashby-de-la-Zouch.

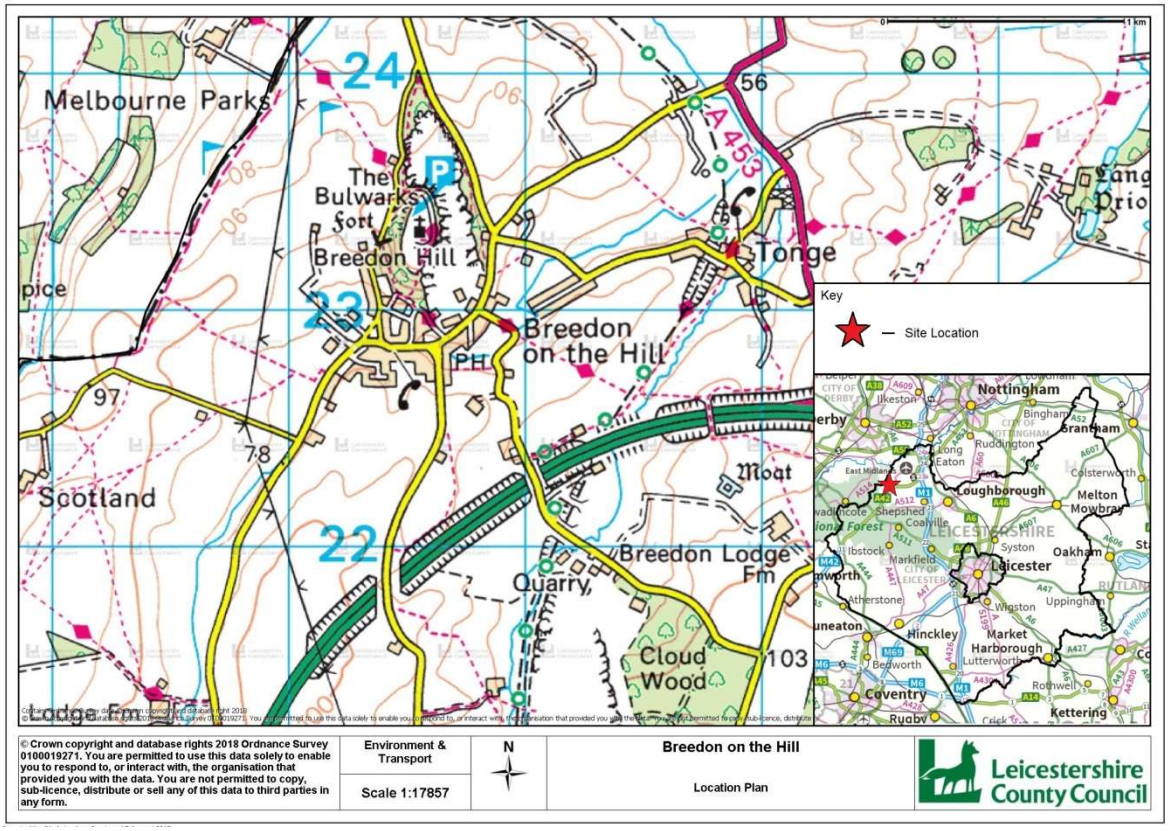


Figure 1: Location Plan

2.2. LOCAL DRAINAGE SYSTEM

Ordinary watercourses

There are two unnamed watercourses within the village both of which are classified as ordinary watercourses. The most significant watercourse (Watercourse 1 as illustrated on Figure 2) enters the village from the south west and flows west to east through the village with a smaller tributary (Watercourse 2) joining it within the village to the rear of the properties on The Crescent at approximately National Grid Reference 440455, 322795 which originates from the south of the village. Part of Watercourse 1 which conveys flows into the village for approximately 500m along Ashby Road is maintained by Leicestershire County Council. The remainder of Watercourse 1 and Watercourse 2 is owned and maintained by multiple landowners.

Due to the nature of the village there are a number of sections of the watercourses which are culverted/constrained; the most notable of which is a 1200mm concrete culvert on Watercourse 1 (refer to **Appendix A, Culvert C**) which flows beneath Ashby Road and The Green as the watercourse initially enters the village.
Beneath Worthington Lane and Doctors Lane are highway culverts which are maintained by Leicestershire County Council as Highway Authority. There are also a range of additional culverts which are the responsibility of various riparian landowners varying in size and condition. Details within **Appendix A** indicate culvert locations, types and approximate capacities.

Historically, water from these fields above The Green drained overland via the natural contours and through dedicated land drainage systems believed to have connected into the historic open watercourse that flows through The Green. The original route of this watercourse can be seen on the 1884 historic map (refer to **Appendix B**). Where it is still present, it is unclear where the historic field drain now connects or interacts with the culverted section of the watercourse.

Further investigations to assist our understanding the drainage network are ongoing and are included in the Agreed Actions as described in Section 6.

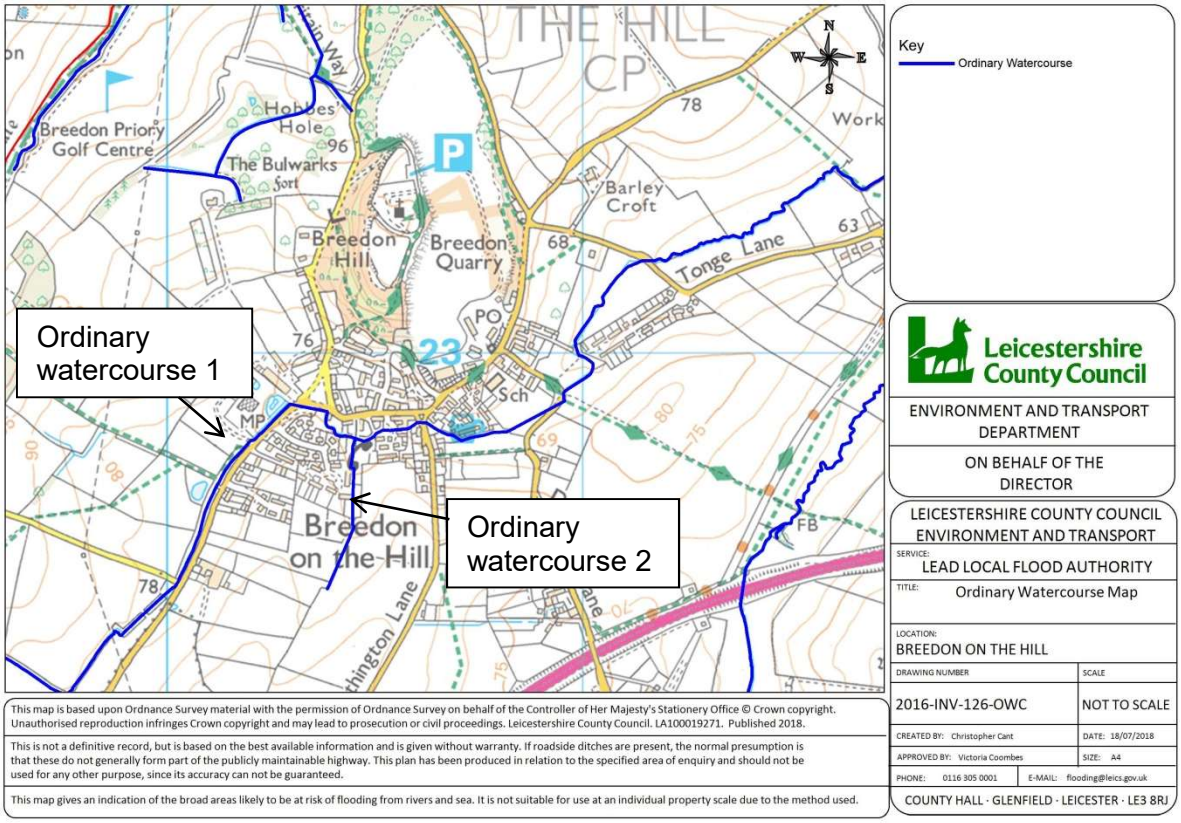


Figure 2: Location of watercourses

Public sewer network

The village is predominantly served by a combined public sewerage system, which conveys both foul and surface water flows.

There are two dedicated surface water systems within the village that serve some of the newer developments and areas of The Green and The Dovecote which outfall directly into the unnamed ordinary watercourse. All public surface water sewerage systems and foul sewerage systems are maintained by Severn Trent Water.

Highway Drainage Network

The local highway drainage comprises a combination of traditional highway gullies, combined kerb drainage and linear drainage channels. The majority of these outfall directly into the unnamed ordinary watercourse. Leicestershire County Council as the local highway authority is responsible for the maintenance of the highway drainage and outfalls.

2.3. LANDSCAPE AND SURFACE WATER DRAINAGE

Breedon on the Hill is notable for its limestone hill that rises 122 metres (400 ft.) above sea level in a generally low-lying landscape. A large portion of the hill has been cut away by an active quarry. The catchment surrounding Breedon on the Hill, particularly upstream, consists of open farmland, recreational land and Highways England maintained A42, drainage which feeds directly into the watercourse. An unnamed ordinary watercourse runs from west to east splitting the village (north and south).
The village is linear in nature, built up around this unnamed ordinary watercourse and features a Village Green ('The Green') to the west. Figure 3 illustrates how the land surrounding the village tips steeply towards the centre.

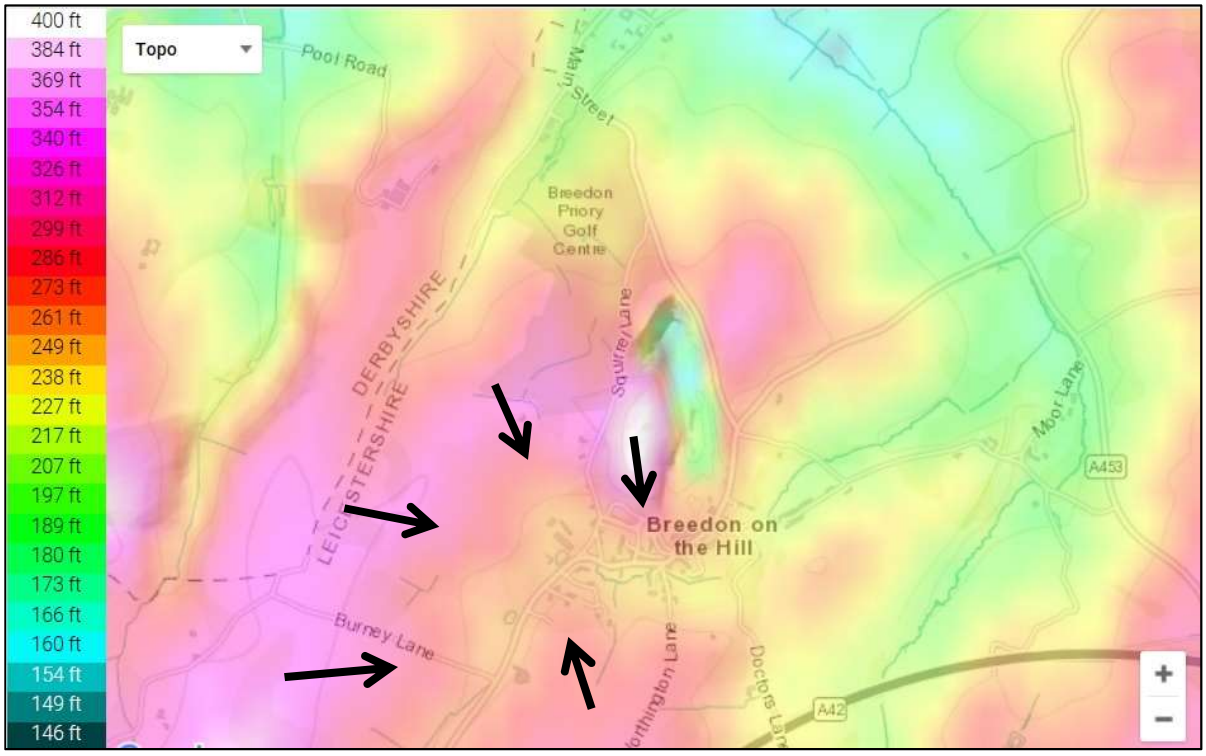


Figure 3: Map illustrating land height (black arrows indicate the flow direction and the direction the land is falling)

2.4. HISTORICAL FLOOD INFORMATION

Prior to the events of 15th June 2016, there were no previously received reports of flooding incidents in Breedon on the Hill by Leicestershire County Council since it became Lead Local Flood Authority in 2010. However, since the formal flood investigation began, there are numerous anecdotal accounts that indicate that the village of Breedon on the Hill has previously flooded on approximately five occasions in the preceding twenty years.

3. THE FLOODING INCIDENT - 15TH JUNE 2016

The majority of the information supporting the description of the flooding incident is based on first-hand accounts of affected residents and the local flood wardens collected from a multitude of public meetings.

3.1. INFORMATION PRIOR TO THE EVENT

In the days prior to the flood incident there had been several episodes of extreme and persistent rainfall causing the ground to be saturated.

On Tuesday 14th June 2016, the day before the flooding incident, Leicestershire County Council and other Risk Management Authorities received weather warnings from the Flood Forecasting Centre. The Flood Forecasting Centre (FFC) is a partnership between the Environment Agency and the Met Office combining meteorology and hydrology expertise.

Leicestershire County Council received the following 'yellow' flood guidance statement on Tuesday 14th June 2016:

'Weather Conditions

Heavy and thundery slow moving showers will develop again through the late morning and early afternoon on Tuesday, with the heaviest focussed over central parts of England and Wales. These showers are expected to bring rainfall amounts similar to what we have experienced these past few days. Where the heaviest showers and thunderstorms occur there is the potential for 20-30 mm in 1 hour and 30-40 mm in 3 hours locally.

Further heavy and slow moving showers look like breaking out over much of England again during Wednesday afternoon. These showers could persist overnight into Thursday morning and become intense once again through the late morning. These showers will again be heavy leading to an increased flood risk.

Local Flood Risk

The river flood risk is VERY LOW for the next five days. Heavy showers today (Tuesday), through Wednesday and Thursday bring a very low likelihood of minor impacts from river flooding, especially if these heavy showers fall over small rapid responding or urban catchments. Due to the uncertainty within the weather forecast and the locations likely to be affected we are closely monitoring the situation and will issue Flood Alerts and/or Flood Warnings as required. We have operational staff out at the moment checking our watercourses and clearing debris screens.

Surface water – The surface water flood risk is LOW for today (Tuesday), Wednesday and Thursday. During the late morning and through the afternoon on Tuesday, Wednesday and Thursday there is a medium likelihood of minor surface water flooding as localised heavy showers and thunderstorms develop.'

The guidance statements support and explain that Breedon on the Hill was subject to a discrete cloud burst/intense rainfall event.

As only a 'yellow' flood guidance statement was issued, this meant that Leicestershire Leicester and Rutland Prepared (LLR Prepared - the emergency response unit for the Council) were on standby but it was impossible to know where and at what time these storms were to hit.

At the time there was one known flood warden but no emergency action plans existed.

The Flood Warden made several attempts to communicate with LLR Prepared in the am but these were unsuccessful. The watercourse and gullies had been periodically checked by the flood wardens however the event originated overnight which meant that no warnings or mitigating actions could be implemented. Therefore no emergency actions/preparation such as warning the public was conducted.

3.2. DESCRIPTION OF THE EVENT – 15TH JUNE 2016

On Wednesday 15th June 2016 there was a very intense rainfall event with, approximately 60mm of rain falling within the area (source: Mount St Bernard's rain gauge – located north east of Coalville). This rainfall caused increased surface water flows, caused the water levels within the localised watercourses to rise significantly and exceeded the design capacity of drainage systems. According to anecdotal reports, at least 20 residential and commercial properties suffered internal flooding, in some cases up to a depth of up to 750mm, with similar depths of water being held within the road and external spaces. Reports note that floodwater was seen flowing at a significant velocity through the village.

The flooding began at approximately 6am and continued until approximately 2pm. Resident and witness accounts on the day of the incident indicate that flooding was experienced from watercourses, the highway, surface water/overland flow and the public sewer system. Figures 4 and 5 illustrates the watercourse catchments and where flooding was witnessed to be coming from, including:

- Surface water/overland flow across undeveloped areas to the west of the village (including agricultural fields, the golf course and private property). This was water naturally following the steep contours of the land and was running off at high speed due to the steepness of the land. This water ended up flooding the highway at various locations and contributed to the flooding at the low points of the village in particular 'The Green'. This water added to that which had already fallen on the highway. Whilst the area of The Green and hedge line ditches may provide a small amount of attenuation (from the flows from the old historic watercourse route towards The Green), the storm intensity witnessed far exceeded this capacity further contributing to the surface water entering Main Street.
- Water fell directly onto the highway which naturally accumulated at low points. Water was described to be flowing down The Delph, Main Street (West and East), Worthington Lane and Melbourne Lane. Most of the roads within the

village fall towards Main Street and The Green hence why they became so inundated with water.

- Gulley capacity was exceeded and overflowed as they became unable to discharge as water levels in the watercourses became so high. This further contributed to highway flooding.
- The public sewerage system became overwhelmed as flood water seeped in and overwhelmed the system. It was also overwhelmed because of the huge quantities of surface water. This further contributed to highway flooding.
- Water was described to have been backing up at various culverts which quickly became blinded by debris that had washed down and then forced water onto adjacent land (including into residential dwellings) as well as the highway.
- The watercourses themselves eventually exceeded capacity and as they exceeded their bank depth flows came out of bank and flooded adjacent land and properties, in particular at properties along The Lime Kilns, Worthington Lane and those that lined the watercourse upstream of The Lime Kilns. Water was also witnessed flowing out of bank (watercourses) onto the highway at various locations including Nottingham Road, Ashby Road, Main Street, Worthington Lane, Doctors Lane, the apron entrance to Pear Tree Mews and Berry Avenue. Again, this added to water that had fallen directly onto the highway. A lot of this water accumulated at The Green and at Worthington Lane where exceptional depths of flooding were experienced. Where the highway tipped towards residential properties, their thresholds were exceeded in many instances resulting in internal property flooding especially at Main Street and Worthington Lane.

Pictures 1 & 2: Illustrating the extent of flooding on the village green and water being conveyed along Main Street during the events of 15th June 2016. Picture 2 is a video still taken by the fire and rescue service at it approached the village centre.

Picture 3: Local resident's photo showing watercourse levels within the channelled sections through the village during the rainfall event on the 15th June 2016 facing upstream of The Lime Kilns towards the pedestrian access bridge onto Pear Tree Mews.

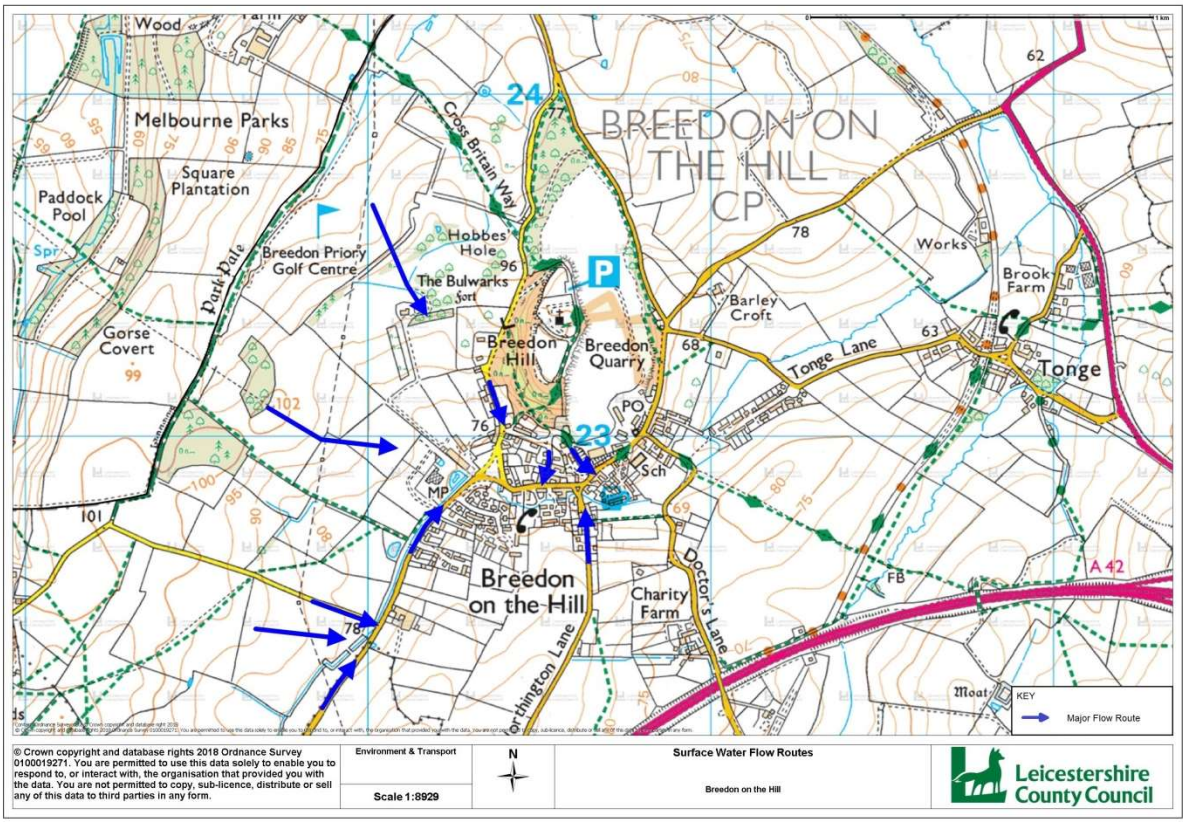


Figure 4: Map illustrating key flow routes into Breedon

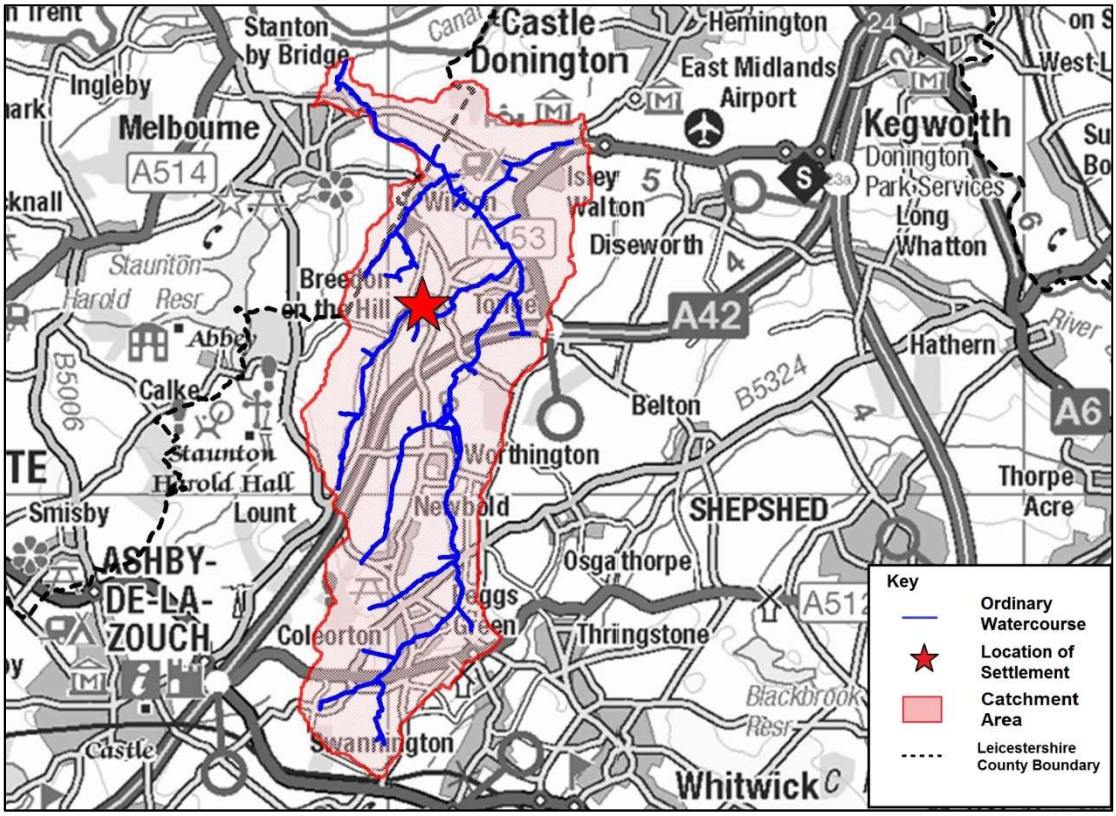


Figure 5: Watercourse Catchment Boundaries

3.3. AFTER THE EVENT

FLOOD RECOVERY SURGERY

Following the event, Leicestershire County Council held a flood recovery surgery on 6th August 2016 in conjunction with the appropriate Risk Management Authorities and the National Flood Forum in addition to speaking to those impacted by the flooding in order to establish and further quantify the physical effects of the incident.

Since this flood recovery surgery there have been multiple site visits that have been attended by colleagues of the County Council, District Council, Severn Trent Water, Highways England etc.

Volunteers formed a Flood Action Group / Flood Watch Group under the auspices of the Parish Council in the aftermath of the event. This involved undertaking clearance sessions along riparian sections at various intervals as dictated by watercourse conditions.

FLOOD/HISTORICAL MAPPING

Following on from the event, the Council analysed available flood mapping and any other data to help understand what happened on 15th June 2016.

Appendix C illustrates the flood risk from surface water flood map. This mapping was produced from high level modelling which recreates where water would fall during certain rainfall events. This mapping closely replicates the surface water flooding (including the flow paths) which was observed on 15th June 2016.

Appendix D illustrates the fluvial flood risk map which again closely replicates the areas of flooding that were experienced as a result of watercourse flooding on 15th June 2016.

A review of historical mapping (**Appendix B**) identifies Watercourse A in its original location around The Green prior to culverting along its current route. Following the events of 15th June 2016, the Council conducted a site visit whereby, evidence was found to suggest the land drain outlet openly discharges to the hedge line and an area of The Green. It can be concluded that, whilst the area of The Green and hedge line ditches may provide a small amount of attenuation, the storm intensity witnessed far exceeded this capacity, further contributing to the surface water entering Main Street.

RAINFALL ANALYSIS

The Hydrological Summary produced by the Centre for Ecology and Hydrology for June 2016 states:

'After the first week, June was a month dominated by unsettled conditions with localised thundery showers bringing substantial rainfall. At the national scale, June rainfall totals were above average (147%) and several regions recorded more than 150%'.

The Environment Agency has provided initial rainfall data from the Mount St Bernard's Rain Gauge, being the closest weather station to Breedon on the Hill (refer to Table 1). The rainfall witnessed in Breedon on the Hill on the 15th June 2016 is deemed to be equivalent to a 1 in 50 year storm with 43.6mm of rain falling within a 2 hour period. Over a 12 hour period from June 14th into the 15th 60mm of rain fell. It can therefore be explained that the amount of rainfall which fell during this event is significant when compared with the rainfall total for the whole month (being 181mm).

Source: http://nrfa.ceh.ac.uk/sites/default/files/HS_2016_June.pdf

Mt St Bernard's Rain Gauge	Rainfall (mm)	Start	End	Event Rarity (1 in n years)
15 min	9	15/06/2016 06:00	15/06/2016 06:15	3
30 min	16	15/06/2016 06:00	15/06/2016 06:30	7
1 hour	28.2	15/06/2016 05:30	15/06/2016 06:30	21
2 hour	43.6	15/06/2016 05:15	15/06/2016 07:15	48
3 hour	48	15/06/2016 05:15	15/06/2016 08:15	45
6 hour	50.6	15/06/2016 04:45	15/06/2016 10:45	27
12 hour	60	14/06/2016 20:45	15/06/2016 08:45	23

Table 1: Environment Agency rainfall data. This data is subject to change pending further analysis by the Environment Agency and should be classed as un-confirmed at the time of this report being published.

The rainfall data above illustrates that Breedon on the Hill was subjected to an intense and discrete local cloud burst. The Council was also aware that the community of Whitwick in Leicestershire was also affected on 15th June 2016. It is understood that just over the border in Melbourne, Derbyshire was also impacted.

4. SUMMARY OF IMPACTS AND FINDINGS

Ordinary Watercourse	Main River	Surface Water	Groundwater	Public Sewer	Canal	Land Drainage	Highway Drainage
☑	☐	☑	☑	☑	☐	☑	☑

Summary of flood sources

Residential	Business	Other Buildings	Roads	Critical Infrastructure
At least 20		Various outbuildings etc.	All through roads and many side roads impacted	0

Receptors impacted

The main impacts of the event took place on 15th June 2016. Approximately 20 residential and commercial properties were impacted

On 14th June a yellow weather warning was issued, so as could be expected, residents had be unable to take any action in anticipation of a risk of flooding. The flooding that occurred on 15th June 2016 was a result of an intense rainfall event that fell on a concentrated area within a short period of time. The result of the combination of factors described below was the ingress of storm flood water to residential and commercial properties in Breedon on the Hill:

- The intense rainfall event resulted in large quantities of water in such a short space of time that overwhelmed the local drainage system.
- The inability of the watercourse to cope with the increased flow rates caused by the above.
- The location of the affected properties at the base of a large steep sided catchment.
- The low thresholds of many of the affected properties that are situated close to the highway. This allowed easy access of any water on the highway into properties.
- The lack of watercourse maintenance over many years and various watercourse constrictions whereby, over time, the built environment of the village has encroached within the flood plain and channel itself. This includes multiple culvert (road) crossings (private accesses and those carrying the public highway), service crossings, buildings on the banks of the watercourse located within an area identified at flood risk from surface water etc. This resulted in the watercourse having less capacity to convey flow than in its natural state, the watercourse being less efficient at conveying flow and the watercourse having nowhere to flow safely once it had reached bank capacity.

There are many factors that may have exacerbated the impacts of the flood event. Whilst these factors may have made a marginal difference to peak flood levels, there is no firm evidence that these factors would have prevented any of the internal flooding experienced by this event. This is because the intense short-lived rainfall event overwhelmed the local drainage system.

These factors include:

- Watercourses and highway gullies requiring maintenance.
- The shock of the event (as it had not happened before) and lack of preparedness.

The flooding closely replicated that of the predictive flood modelling however it was agreed that more detailed modelling would be required to better understand the event, provide a more accurate representation of the culverts and watercourse and also to help identify future flood mitigation options for the future.

5. RESPONSIBILITIES

5.1. RIPARIAN LANDOWNERS OF WATERCOURSES

According to National Government advice on 'Owning a Watercourse', riparian landowners have certain rights and responsibilities including:

- They must maintain the bed and banks of their watercourse, and also the trees and shrubs growing on the banks;
- They must clear any debris, even if it did not originate from their land. This debris may be natural or man-made;
- They must keep any structures that they own clear of debris. These structures include (but are not limited to) culverts, trash screens, weirs and mill gates.

All riparian owners have the same rights and responsibilities. These responsibilities include the requirement to keep any structures, such as culverts, trash screens, weirs and mill gates clear of debris". However, a landowner has no duty in common law to improve the drainage capacity of watercourse he/she owns.

A full explanation of the rights and responsibilities of riparian ownership are given online at https://www.gov.uk/guidance/owning-a-watercourse

5.2. INDIVIDUAL HOMEOWNERS

Local residents and tenants who are aware that they are at risk of flooding should take action to ensure that they and 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.

5.3. NORTH WEST LEICESTERSHIRE DISTRICT COUNCIL

North West Leicestershire District Council has powers under Section 14 of the LDA to undertake flood risk management works on ordinary watercourses (excluding Main Rivers), where deemed necessary. Under Section 20 of the LDA, North West Leicestershire District Council has the powers (by agreement of any person and at their expense) to undertake drainage work which that person is entitled to carry out and maintain.

5.4. LOCAL HIGHWAY AUTHORITY (LEICESTERSHIRE COUNTY COUNCIL)

The Council are also defined as the local highway authority, and have a duty to maintain the public Highway under Section 41 of the Highways Act (1980).

Section 100 states that the Council also has the responsibility and power to prevent water running onto the highway from adjoining land.

5.5. WATER COMPANY (SEVERN TRENT WATER)

Water and sewerage companies are responsible for managing flood risk related to surface water, foul water and combined sewer systems. Public sewers are designed to protect properties from flood risk in normal wet weather conditions. In extreme weather conditions, however, there is a risk of these public sewers being overwhelmed, resulting in sewer flooding.

Following the 'Private Sewer Transfer' on 1st July 2011, water companies are now responsible for all pipes systems on private land that serve more than one curtilage and are connected to a public sewer. Under Section 94 of the Water Industry Act (1991) statutory sewerage undertakers have a duty to provide sewers for drainage of buildings and associated paved areas within property boundaries.

Water companies are responsible for all public sewers and lateral drains. Public sewers are a conduit (typically a pipe) assigned to a water and sewerage company that drains two or more properties; conveying foul, surface water or combined sewerage to a positive outfall. Connection of other drainage sources to public sewers is discretionary following an application to connect.

5.6. HIGHWAYS ENGLAND

Highways England has sole responsibility and powers for managing Highway surface water runoff from the trunk road network (i.e. M1, M42, A42 etc.).

5.7. LLFA (LEICESTERSHIRE COUNTY COUNCIL)

The Council has a range of statutory duties under the FWMA, 2010 as the LLFA and has the responsibility to coordinate the management of local flood risk across Leicestershire.

As stated previously, the Council as the LLFA has a duty to investigate flood incidents under Section 19 of the FWMA. Publication of this report is the conclusion of that process.

The LLFA also has a responsibility to maintain a register of drainage assets which are considered to provide a significant role in the mitigation of flood risk (as detailed within Section 21 of the FWMA). The register must contain a record detailing each structure or feature including ownership and state of repair. As the LLFA the Council look for support and information from other agencies that are designated as RMAs to ensure any assets which could potentially have a significant effect on flood risk are recorded on the asset register.

As the LLFA the Council has permissive enforcement powers related to ordinary watercourses within private ownership. The duty to maintain the ordinary watercourses on private land however rests with the relevant riparian landowner.

6. AGREED ACTIONS

6.1. LEICESTERSHIRE COUNTY COUNCIL

Leicestershire County Council has agreed / undertaken the following:

- The Council will work to better understand the flooding incident of 15th June 2016. This will include commissioning an external consultant to gather all available information and conduct a modelling study which will aim to identify any potential future flood mitigation options for the community. The Council will then seek to identify potential sources of partnership funding to pay for this work. The Council will involve the local community and flood wardens in the development of the model and options.
- The Council will continue to work closely with the local community (including flood wardens) to understand the events of the 15th June 2016 to help inform the further investigations.
- The Council will continue to work with the Flood Wardens and local residents to ensure that riparian land owners are fully aware of their maintenance responsibilities for the watercourse and issue Guidance Notes to assist with this as well as attending site visits as required. The Council will also work with homeowners and the local flood wardens to help them be better prepared for potential future flood incidents.
- The Council will continue to work to investigate unconsented activities on ordinary watercourses and work with the landowners who have undertaken these activities to ensure that any works have not exacerbated the flood risk for the community. This includes incorporating any unconsented works into the modelling study and flood mitigation optioneering.
- The Council will continue to liaise with Highways England to investigate the potential impact of their system on the flood event.
- The Council will continue to liaise with Severn Trent Water to understand the status of their current public sewer network.
- The Council will add private sections of culverted watercourse onto the Council's asset register. They however will remain as private assets. The Council will work with these landowners in an attempt to ensure the assets remain fully functional.
- The Council have undertaken cleansing of publically owned highway assets (including culverts, ditches and gulleys). The Council will continue to work with/support other riparian landowners to ensure the maintenance/cleansing of private assets.
- The Council have installed a flow gauge on Watercourse 1 to monitor flow levels. This gauge is in place indefinitely and provides flow information to help calibrate the flood model. It is also used to help inform local residents and the flood wardens of the rising water levels so as to enable local emergency plans to be enacted.

6.2. SEVERN TRENT WATER

Severn Trent Water has agreed the following actions:

- To work collaboratively with the LLFA with their modelling/investigative work where appropriate.

6.3. HIGHWAYS ENGLAND

Highways England has agreed/undertaken the following:

- Agreed to further investigate their drainage infrastructure from the A42 and the potential impacts on the downstream community.
- Agreed to work closely with the Council and support their investigations/modelling study and contribute towards potential options were possible/appropriate.

6.4. PRIVATE RIPARIAN LANDOWNERS

The private riparian landowners have agreed the following:

- All riparian landowners contacted to date have agreed to maintain their section of the watercourse to ensure that it is freely flowing.

6.5. THE PARISH COUNCIL / LOCAL COMMUNITY / FLOOD WARDENS

The local community/flood wardens have agreed/undertaken the following:

- Written to riparian landowners to make them aware of their duties and responsibilities.
- Identified and appointed for flood wardens who are all active members in the Flood Action Group.
- Work closely with the Council to develop the community flood plan.
- Work closely with the Council to act as representatives for the community when undertaking site visits etc.
- Work closely with the Council to continue to help spread the awareness of riparian responsibilities and the need to obtain consent for works on ordinary watercourses.
- Held six official volunteer watercourse clearance sessions between November 2016 and June 2018 to dredge/cleanse the watercourse of debris.
- Are writing the communities Community Flood and Community Response plan under the jurisdiction of LLR Prepared as a precursor to unlocking funding to support ongoing flood mitigation measures at local level.

7. SOURCES OF INFORMATION

The following information has contributed to this report:

- Countless emails, photos, videos and reports kindly issued by the local residents including the Flood Wardens.

- Video evidence from the Fire and Rescue service from 15th June 2016
  https://www.youtube.com/watch?v=jlqm-Te2ED4
  https://www.youtube.com/watch?v=3m6_-CVoe-Q
  https://www.youtube.com/watch?v=qJPI37THjwY.

- Verbal information received from public meetings attended by the Council on 12th October 2016, 6th December 2017 and 27th March 2018.

- Multiple ad hoc and arranged site visits unaccompanied or accompanied by the Flood Wardens/affected residents.

- Flood Forecasting Centre and Met Office statements and warnings.

8. STATUS OF REPORT AND 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"[1]. 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 at Section 1.4 of the body of this report. The flood risk management functions which the Risk Management Authorities are proposing are described at Section 6 of 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.

[1] *As defined by Section 6(13) of FWMA*

Appendices

Appendix	Description
Appendix A	Culvert Capacities and Locations
Appendix B	Historic Map 1884
Appendix C	Flood risk from Surface Water
Appendix D	Fluvial Flood Map

Glossary

Acronyms / Term	Definition
AEP	Annual Exceedance Probability
AW	Anglian Water
EA	Environment Agency
FWMA	Flood and Water Management Act 2010
IDB	Internal Drainage Board
LCC	Leicestershire County Council
LDA	Land Drainage Act 1991
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
Main River	Those watercourses for which the Environment Agency is the relevant RMA
Ordinary watercourse	Any watercourse that is not a Main River, and the LLFA, District / Borough Council or IDB is not the relevant RMA
RMA's	Risk Management Authorities
STW	Severn Trent Water
The Council	Leicestershire County Council
uFMfSW	updated Flood Map for Surface water
WRA	Water Resources Act 1991

APPENDIX A – CULVERT CAPACITIES AND LOCATIONS

Note: All measurements are taken from soffit to bed of watercourse

Culvert A:
Location: Burney Lane. Adj. to junction Ashby Road.
Classification: LCC Highways culvert
Type: Concrete Box Culvert
Size: 830mm Height/ 1370mm Width
Capacity: 1.93m^3/s

Culvert B:
Location: Adj. to Ashby Road.
Classification: LCC Highways/ Riparian culvert
Type: Concrete Circular Culvert
Size: 1200mm Diameter
Capacity: 1.72m^3/s

Culvert C:
Location: Ashby Road under the Green
Classification: LCC Highways culvert
Type: Concrete Circular Culvert
Size: 1200mm Diameter
Capacity: 1.72m^3/s

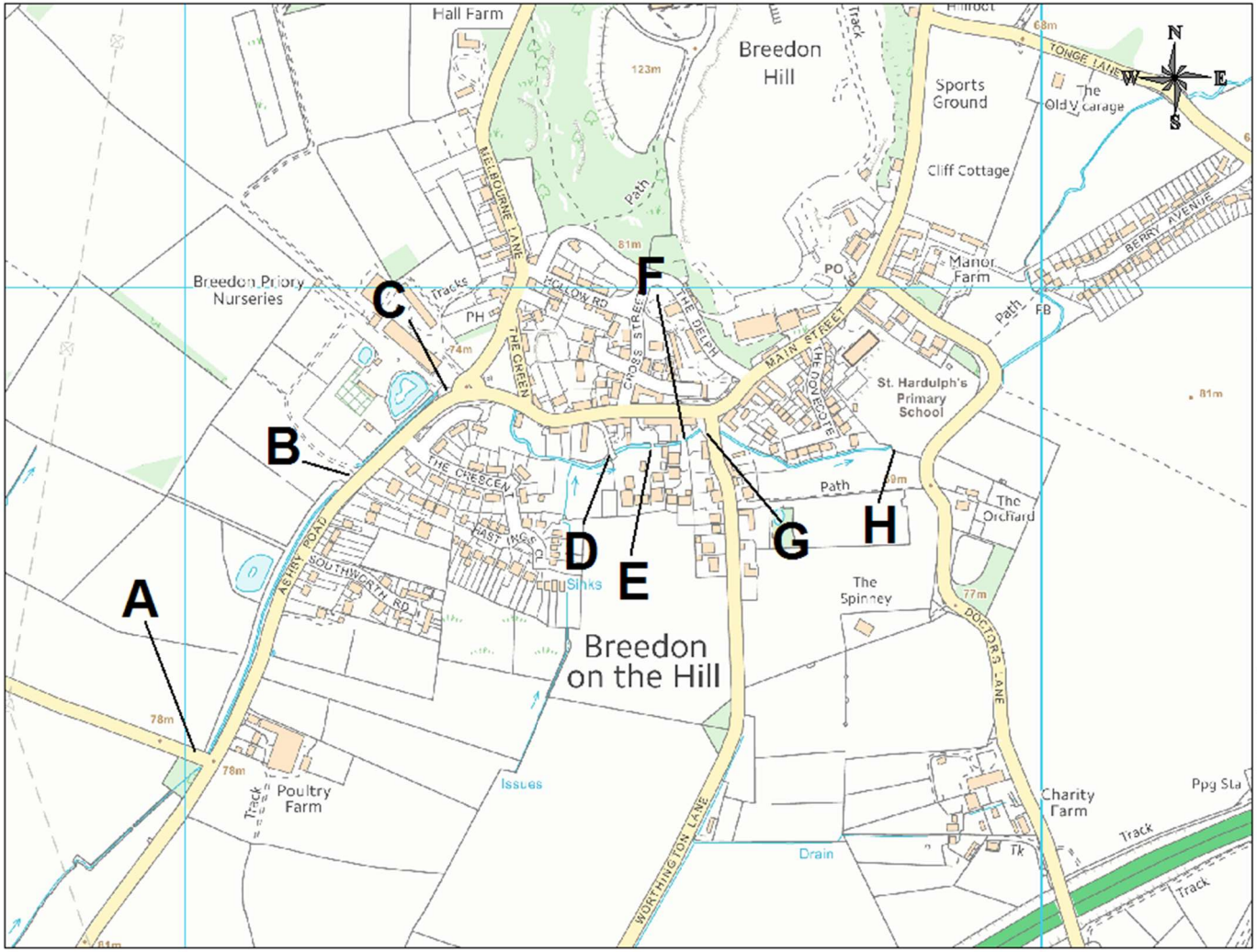
Culvert D:
Location: Private Drive off Main Street
Classification: Private Riparian owned
Type: Twin Circular Masonry Culvert
Size: 850mm Diameter (x2)
Capacity: 2.18m^3/s

Culvert E:
Location: Private property off Main Street
Classification: Private Riparian owned
Type: Concrete Box Culvert
Size: 1270mm Height/ 2400mm Width
Capacity: 5.18m^3/s

Culvert F:
Location: Private property off Main Street/ Lime Kilns
Classification: Private Riparian owned
Type: Concrete Box Culvert
Size: 1270mm Height/ 3300mm Width
Capacity: 5.74 m^3/s
Note: Low Soffit, usable width of 2600mm

Culvert G:
Location: Worthington Lane
Classification: LCC Highways culvert
Type: Concrete Box Culvert
Size: 800mm Height/ 3300mm Width
Capacity: 3.26m^3/s

Culvert H:
Location: Doctors Lane
Classification: Private Property / LCC Highways culvert
Type: Concrete Circular Culvert
Size: 1200mm
Capacity: 1.95m^3/s



Key

Leicestershire County Council

ENVIRONMENT AND TRANSPORT DEPARTMENT

ON BEHALF OF THE DIRECTOR

LEICESTERSHIRE COUNTY COUNCIL
ENVIRONMENT AND TRANSPORT

SERVICE: LEAD LOCAL FLOOD AUTHORITY

TITLE: Culvert Locations and capacities within Breedon on the Hill

LOCATION: BREEDON ON THE HILL

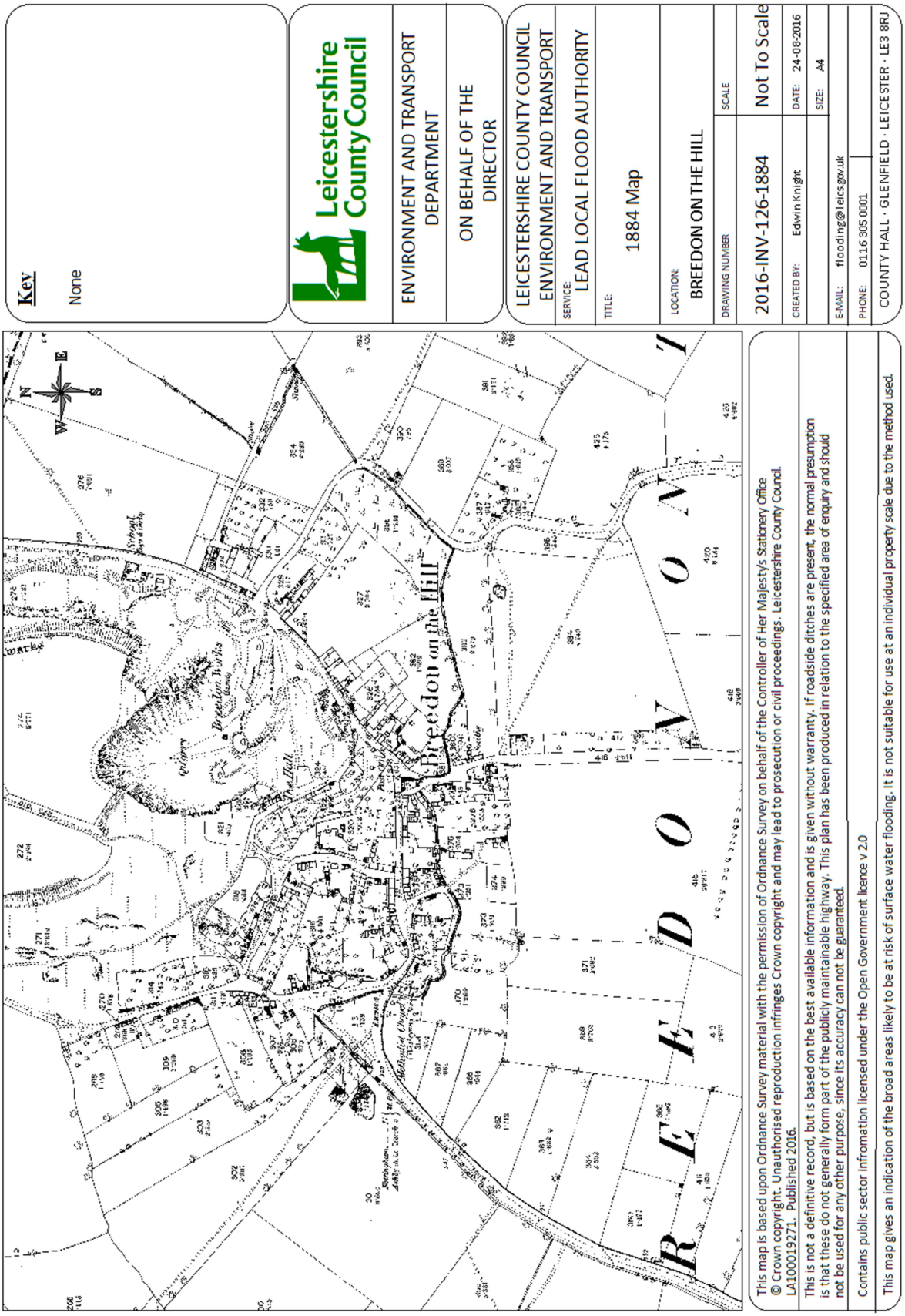
DRAWING NUMBER	SCALE
2016-INV-126	Not To Scale
CREATED BY: Edwin Knight	DATE: 24-08-2016
	SIZE: A4

E-MAIL: flooding@leics.gov.uk
PHONE: 0116 305 0001
COUNTY HALL · GLENFIELD · LEICESTER · LE3 8RJ

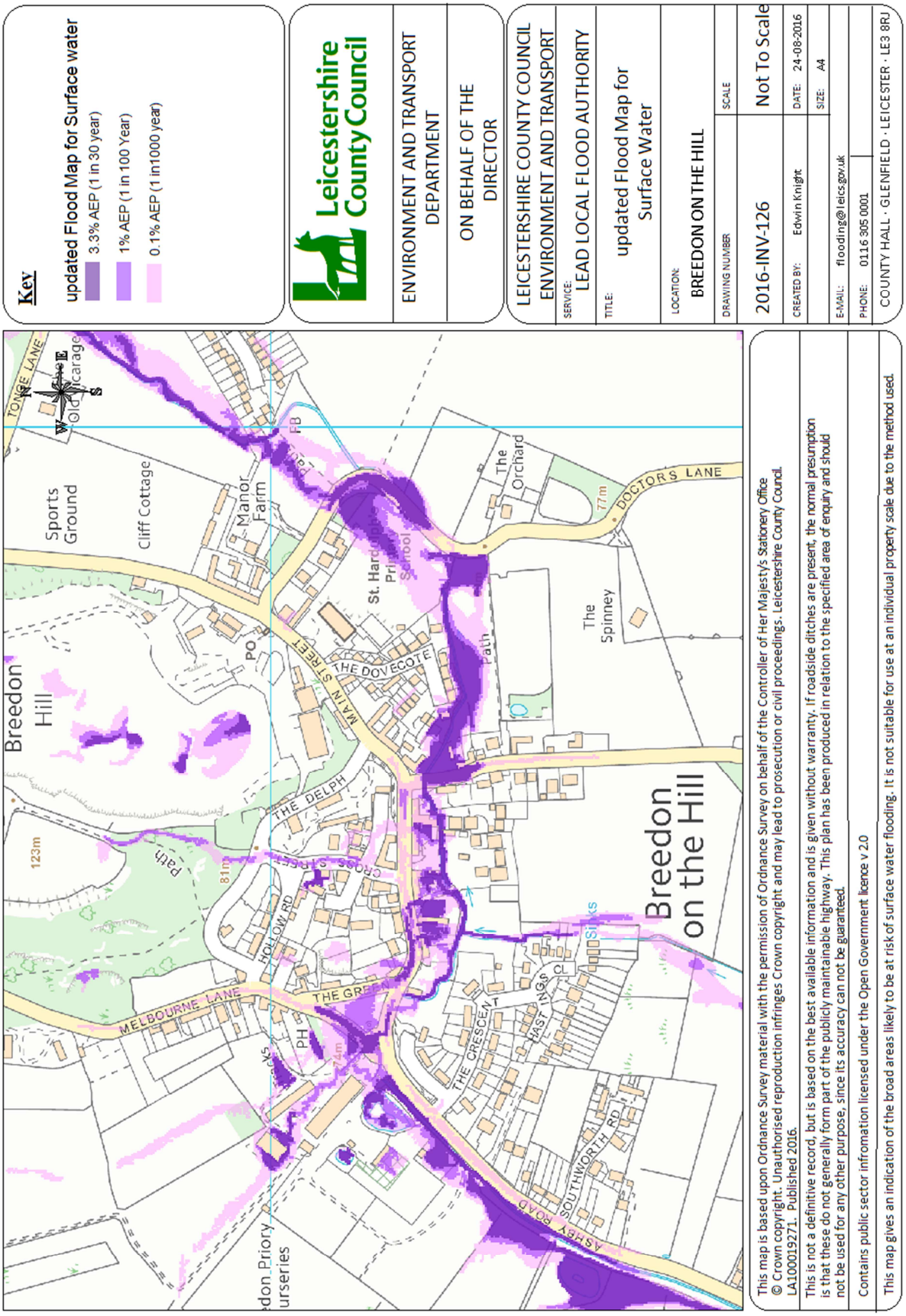
This is not a definitive record, but is based on the best available information and is given without warranty. If roadside ditches are present, the normal presumption is that these do not generally form part of the publicly maintainable highway. This plan has been produced in relation to the specified area of enquiry and should not be used for any other purpose, since its accuracy can not be guaranteed.

This map gives an indication of the broad areas likely to be at risk of surface water flooding. It is not suitable for use at an individual property scale due to the method used.

APPENDIX B – HISTORIC MAP 1884



APPENDIX C – FLOOD RISK FROM SURFACE WATER



APPENDIX D – FLUVIAL FLOOD RISK MAP