Leicestershire County Council

Flood Investigation Report

Stoney Stanton – 1st October 2019

Final Report

April 2021

To discuss this report, please contact the Flood Risk Management Team by email flooding@leics.gov.uk or by phone 0116 305 0001

Contents

EXECUTIVE SUMMARY

Leicestershire County Council (LCC or the Council) has deemed it necessary to carry out a formal investigation into the flooding incident that occurred on 1st October 2019 in Stoney Stanton as the incident met the pre-approved criteria.

The flood event of 1st October 2019 resulted in internal damage to 32 residential properties, one commercial property and a school in Stoney Stanton. The flooding was the result of prolonged rainfall that fell onto a catchment already waterlogged by the wet preceding months. The volume of rainfall exceeded the infiltration potential of the catchment and exceeded the capacity of the existing local drainage network within the village. There are a number of other issues/concerns identified as part of this investigation that are likely to have contributed towards the extent of the flooding and require further investigation. A detailed flood modelling study has therefore been commissioned to further this understanding and investigate potential flood mitigation options.

There are a number of Risk Management Authorities (RMAs) that have relevant flood risk management responsibilities and functions within Leicestershire. Identified RMAs from this formal investigation 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.

1. INTRODUCTION

1.1. SECTION 19 INVESTIGATIONS – DUTY TO INVESTIGATE

Section 19 of the FWMA states:

"(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."*

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

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:

- 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 Stoney Stanton on 1st October 2019 was undertaken as the event triggered 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 (RMA)

The following risk management authorities were identified as relevant to the flooding within Stoney Stanton:

- Leicestershire County Council – Lead Local Flood Authority
- Leicestershire County Council – Local Highway Authority
- Severn Trent Water (STW) – Water and Sewerage Company
- Blaby District Council (BDC) – Land Drainage Authority and Local Planning Authority

2. BACKGROUND

2.1. LOCATION

The village of Stoney Stanton is located approximately 14 km to the south west of Leicester (Figure 1) in the district of Blaby.

2.2. LOCAL DRAINAGE SYSTEM

There is a complex network of drainage features that serve Stoney Stanton.

The public highway drainage network in Stoney Stanton is maintained by LCC who is responsible for any highway drainage assets such as road gullies, highway grips and culverts beneath the highway.

The village is served by a public sewer network comprised of a foul, surface water and combined sewers maintained by STW, with multiple surface water outfalls and combined sewer overflows (CSO's) discharging into the ordinary watercourse network at various locations with the consent of the Environment Agency.

There are many minor local watercourses (classified as ordinary watercourses) that drain Stoney Stanton including privately owned sections of watercourse, agricultural ditches, dykes and culverted sections of watercourse. All ordinary watercourses within the catchment drain to the River Soar (Main River), approximately 1km east of Stoney Stanton.

To the west of the village, a large area of agricultural land drains in a north easterly direction towards the B581 (Station Road) via a network of ditches (ordinary watercourses, highlighted in Figure 1). The watercourse (identified as watercourse A) flows beneath Station Road in a 1050mm highway culvert, and then to the north of the Godfrey Close development in a vegetated open channel. Notable features in this section of watercourse A include a surface water outfall headwall and a footbridge with adjacent fencing within the watercourse (depicted in Photo 1 and located approximately 100m upstream of the Foxbank Industrial Estate). Watercourse A remains an open channel before being culverted through the Foxbank Industrial Estate in a 900mm diameter culvert (an informal trash screen exists at this inlet). There is then a small transect of open watercourse in a section of undeveloped land upstream of Meadow Close (owned by Jelson Homes). The culvert inlet to the rear of Meadow Close is covered by a trash screen before flowing in a dual 750mm culvert, maintained by STW. A short (approx. 90 metres) section of open watercourse, adjacent to Long Street, conveys flow from the dual 750mm culvert to a privately owned 1200mm culvert running under multiple residential properties. The watercourse then discharges into an open watercourse in agricultural land to the east of Stoney Stanton flowing east towards the River Soar.

As a part of this investigation, the Council has additionally become aware of a restriction plate located within watercourse A in the Foxbank Industrial Estate, downstream of the confluence of watercourse A and an additional watercourse, draining a sub catchment to the south of the watercourse (watercourse B).

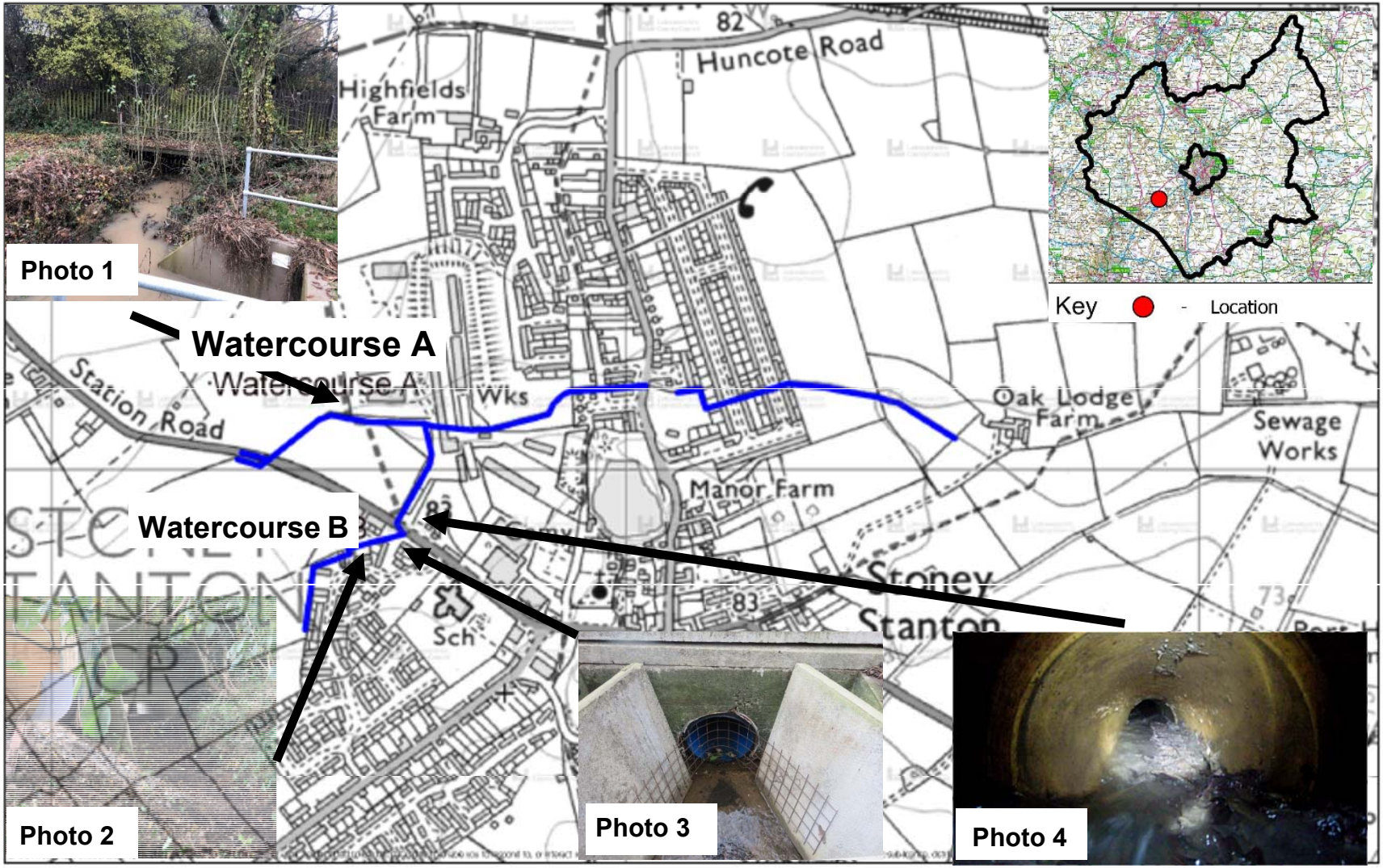


Figure 1: Location of Stoney Stanton and key watercourses

The surface water attenuation pond and flood compensation area located adjacent to watercourse A to facilitate the Godfrey Close development. comprising of a balancing pond to attenuate surface water discharging from impermeable surfaces on the site and a pond to compensate for earthworks completed to enable development.

The extent of the catchment of watercourse B has not yet been understood in its entirety, however following a site walkover and based on evidence obtained locally, a large area of agricultural land to the west of the village drains into the watercourse. The field drainage in this location enters a chamber (adjacent to Fisher Close) before being conveyed in a 600mm culvert/pipe (beneath the land of four residential dwellings) towards Robertson Close. This culvert/pipe then takes a sharp bend beneath Robertson Close towards Mountsorrel Cottages, before discharging perpendicular to watercourse B in another chamber (refer to Figure 2).

Watercourse B exists in an open channel upstream of the chamber where it joins with the 600mm culvert/pipe from Robertson Close. It remains open channel for approximately 60m before being culverted in a 300mm pipe (covered by a private trash screen as shown in Figure 1) under a single private garden. It is then open again for a small section and enters another 300mm culvert where there is another informal trash screen (Figure 1).

Watercourse B leaves private land towards Station Road in a dual 225mm diameter culvert, it then becomes a 670mm diameter culvert beneath Station Road before reducing down to a 300mm diameter culvert (Figure 1). A high-level overflow (450mm diameter) is present from one of the chambers beneath Station Road outfalling into a cut-off ditch adjacent to Foxbank Road.

Watercourse B joins watercourse A upstream of the 900mm diameter culvert and is situated such that water is forced upstream before it can get into the culvert (refer to Photo 7 later in this report) beneath the Foxbank Industrial Estate.

Additional surface water flow routes and outfall structures contribute to the flow of watercourse A, from hardstanding areas and agricultural land to the north of the watercourse, in addition to engineered surface water drainage systems from the Foxbank Industrial Estate to the north of the watercourse.

Unfortunately, limited accurate records are held in relation to the capacity, connectivity and condition of the multiple drainage networks and interactions between different sub-catchments and drainage networks in Stoney Stanton.

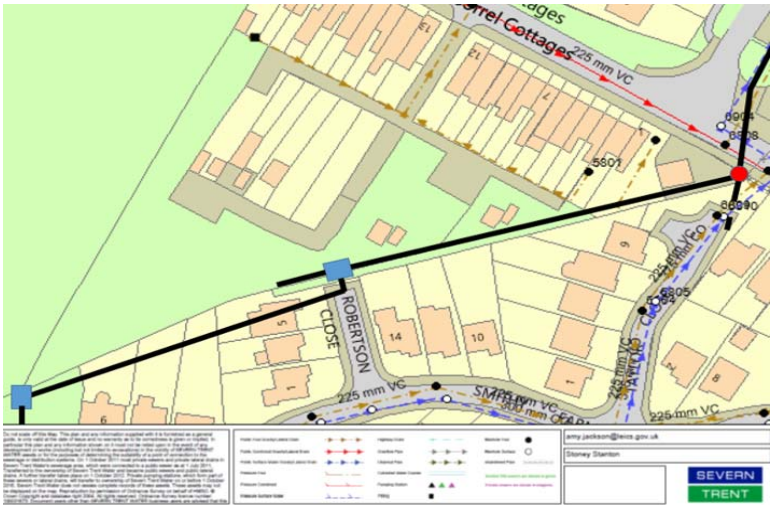


Figure 2: Connectivity of the surface water drainage system serving the agricultural land drainage system to the west of Mountsorrel into watercourse B. STW Plan with annotation provided by Stoney Stanton Flood Action Group

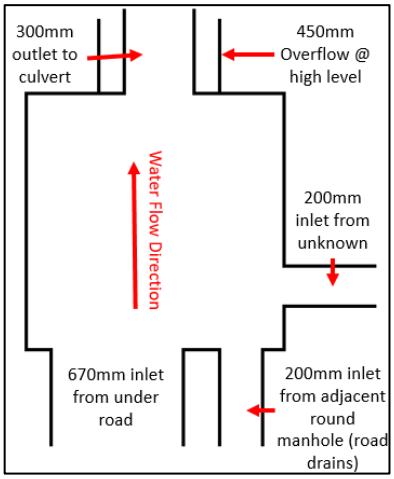


Figure 3: Schematic of connectivity of surface water manhole in junction of Station Road and Foxbank Road. Plan provided by Stoney Stanton Flood Action Group

2.3. HISTORICAL FLOOD INFORMATION

The Council holds a suite of data relating to flooding incidents in Leicestershire obtained from various sources within the County. However, the information held is limited prior to the establishment of the Council as the Lead Local Flood Authority. Prior to the events of the 1st October 2019, the Council has no record of internal flooding incidents within the village of Stoney Stanton.

As a part of this investigation, reports of historic flooding incidents in Stoney Stanton have been since disclosed to the Council and are summarised below.

- 1993 – Flooding to multiple properties on Meadow Close
- 1998 – Multiple rear gardens flooded on Station Road (Mountsorrel Cottages)
- 2004 – Affecting two residential properties on Station Road (Mountsorrel Cottages)

3. THE FLOODING INCIDENT ON 1ST OCTOBER 2019

3.1. INFORMATION PRIOR TO THE EVENT

In the days prior to the flood incident of 1st October 2019, weather warnings had been issued by the Environment Agency covering multiple catchments within central England, including Leicestershire. On the day of the incident, catchments located within central England had already been subject to prolonged and in some cases intense rainfall onto already saturated catchments. On 28th September 2019 the Met Office issued a weather warning covering much of central England (Figure 4) with the area marked below indicated as being at risk of flooding from fluvial and surface water sources, with an estimated duration of up to two days. At this time the Council was on standby for flooding, however it was unknown exactly where and at what time these storms were to hit.

At the time of the flooding incident, the Parish Council had a flood warden in place, their duties were to carry out inspections of the watercourses throughout the village and raise any concerns rather than to react in the event of a flooding incident. In the event of a flood (or any other emergency) the Parish Council activates their emergency response.

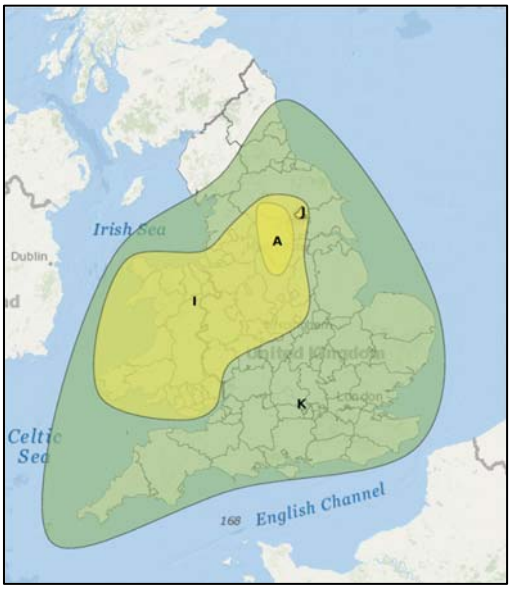


Figure 4: Stoney Stanton fell into an area (marked I) warned by the Met Office that there was a Medium Likelihood of flooding from fluvial and surface water sources of a Minor impact

3.2. DESCRIPTION OF THE EVENT

Five key areas of the village were affected by flood water on 1st October 2019 (as illustrated on Figure 5, labelled with red circles) including:

1. Residential properties on Highfield Street and Meadow Close – 6 Properties (2 garages)

Residential properties flooded from the adjacent watercourse as a result of a partial blockage to the trash screen covering the culvert inlet. It was noted that the trash screen was blocked by vegetation and brash, with the open section of watercourse leading up to the trash screen heavily silted with riparian vegetation within the channel. The obstruction caused water to flow out of bank, flowing eastwardly towards residential properties and gardens and the local highway network in Meadow Close and Highfield Street.

2. Residential properties (Mountsorrel Cottages) on Station Road – 22 Properties.

Water was described to have run off the agricultural field to the rear of the properties towards the local low-point (the properties). Water was also described to have bypassed watercourse B due to the sheer volume of water and due to the most upstream section being filled in. Water was described to have been flowing out of the chamber on watercourse B (where it joins with the 600mm diameter culvert from Robertson Close) with such force that it knocked a local resident over. This water also headed towards the rear of Mountsorrel Cottages.

Water was also described to be coming from the north-eastern corner of the agricultural field, adjacent to Mountsorrel Cottages, and entering the highway at this point and flowing towards the property frontages. This water was described to quickly overwhelm the highway gullies and large volumes of water pooled on the highway. This water then entered properties through their front doors due to a lower property threshold level than the adjacent highway levels.

3. Single residential property on Godfrey Close – 1 Property (3 garages)

Water was described to have breached the highway kerb off Station Road, through the hedge line and entered the property frontage. The threshold level of the affected property is the lowest on the development, in addition to being significantly lower than that of the level of the highway and the dropped kerb outside of the development adjacent to the property.

4. Manorfield Primary School, Smithy Farm Drive

Surface water was described to have run off from the adjacent playing field and entered a single temporary school building internally. This building subsequently became unusable and the flooding caused significant disruption to the day-to-day running of the school.

5. Co-operative shop, New Road

Anecdotal reports suggest that exceedance flows from the highway entered the Co-operative car park via a dropped kerb which was exacerbated by a lack of drainage within the site. Surface water flows entered the shop via a rear store-room entrance resulting in flooding to storage areas and the shop-floor.

The community has an established flood plan and from the point the Parish Council were made aware of the flooding, within 30 minutes the plan had been activated, with parishioners and Parish Councillors informed. The village emergency centre (village hall) was opened and all affected residents were directed to the Village Hall. Within two hours of the hall opening, an arrangement with the Star pub was in place to provide hot food and drink to anyone that was affected by the flooding. Residents with nowhere to stay had accommodation arranged and recorded. BDC resilience team attended a short time after the opening of the village hall and took over the response to the incident.

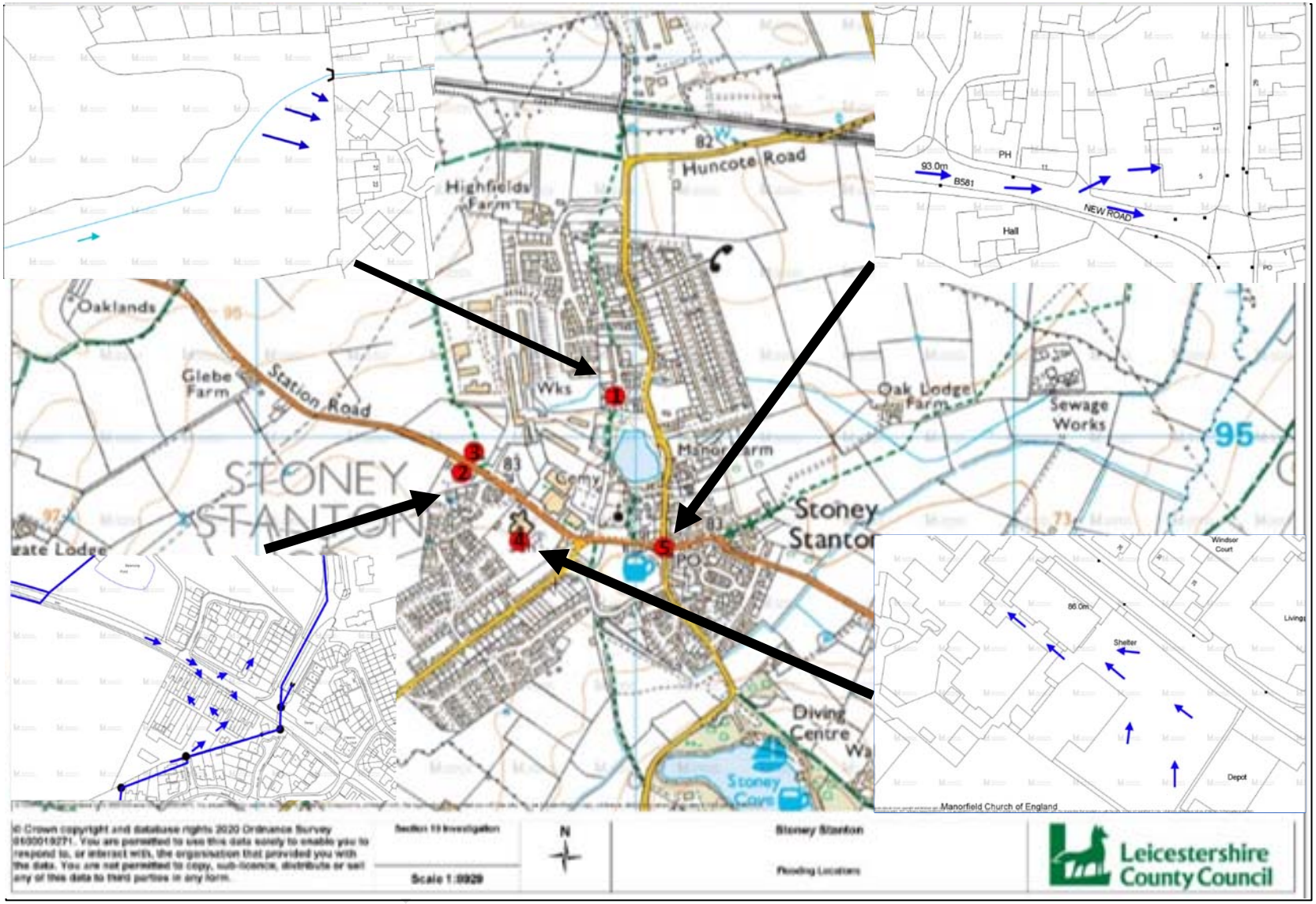


Figure 5: The key locations of flooding incidents in Stoney Stanton on 1st October 2019 (arrows indicate direction of flow)

3.3. INFORMATION AFTER THE EVENT

The majority of the information regarding the flooding is based on first-hand accounts of residents, who were present at a public meeting held following the flooding incident on 1st October 2019 in addition to site meetings and letter-drops to residents in affected areas following the flooding incident. Information has also been collected by partner RMAs from various other site visits and surveying.

In the immediate aftermath of the event, BDC completed clearance works to privately owned watercourses and assets, including the trash screen to the west of Meadow Close. Furthermore, STW and the Council completed a range of reactive jetting of highway and public sewer assets in response to the incident.

Data Analysis

Rainfall was shown to be heavy and persistent in the days immediately preceding the event, saturating the catchment and minimising the potential for natural infiltration.

River flow data collected by NERC during September 2019 in Main River catchments across the UK, illustrated in Figure 6, shows that fluvial flows within the area were approximately 172% of the long-term average. This highlights the extent to which the catchment and fluvial system were at capacity, with minimal infiltration capacity within catchments, exacerbating surface water flow routes within the catchment during the event.

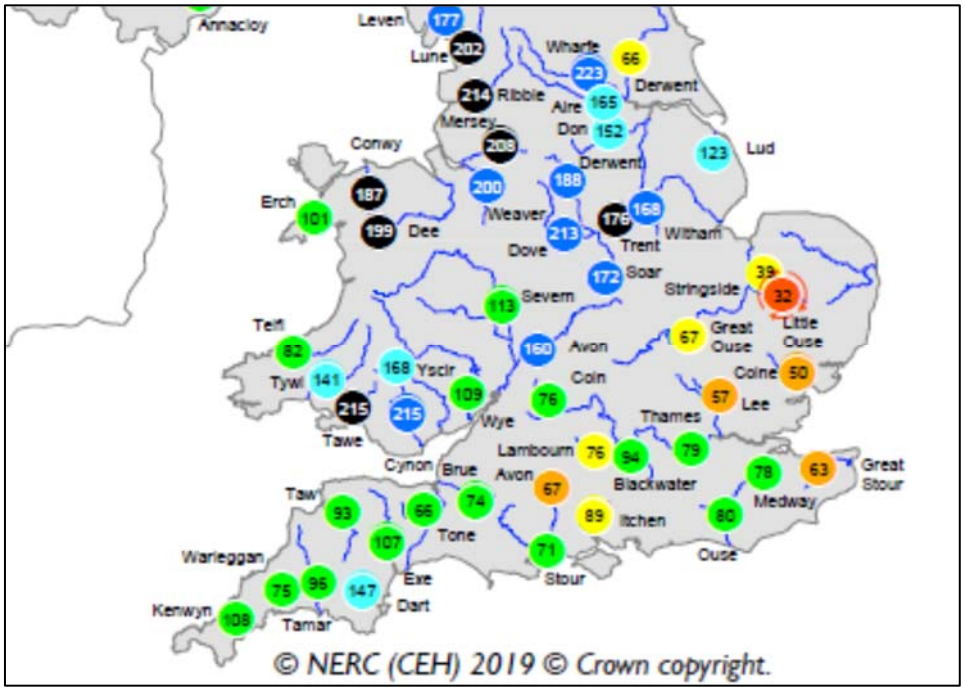


Figure 6: NERC fluvial flow data for August & September 2019. Values (circles) state monthly river flow as a percentage of long-term monthly average.

The Environment Agency's Surface Water Flood Map, replicated in Figure 7, highlights the extent of the areas at risk high of surface water flooding (in the 1 in 30-year event). The extent of flooding in addition to the locations of affected properties during the event of 1st October 2019 are largely consistent with the high-risk surface water flooding extent.

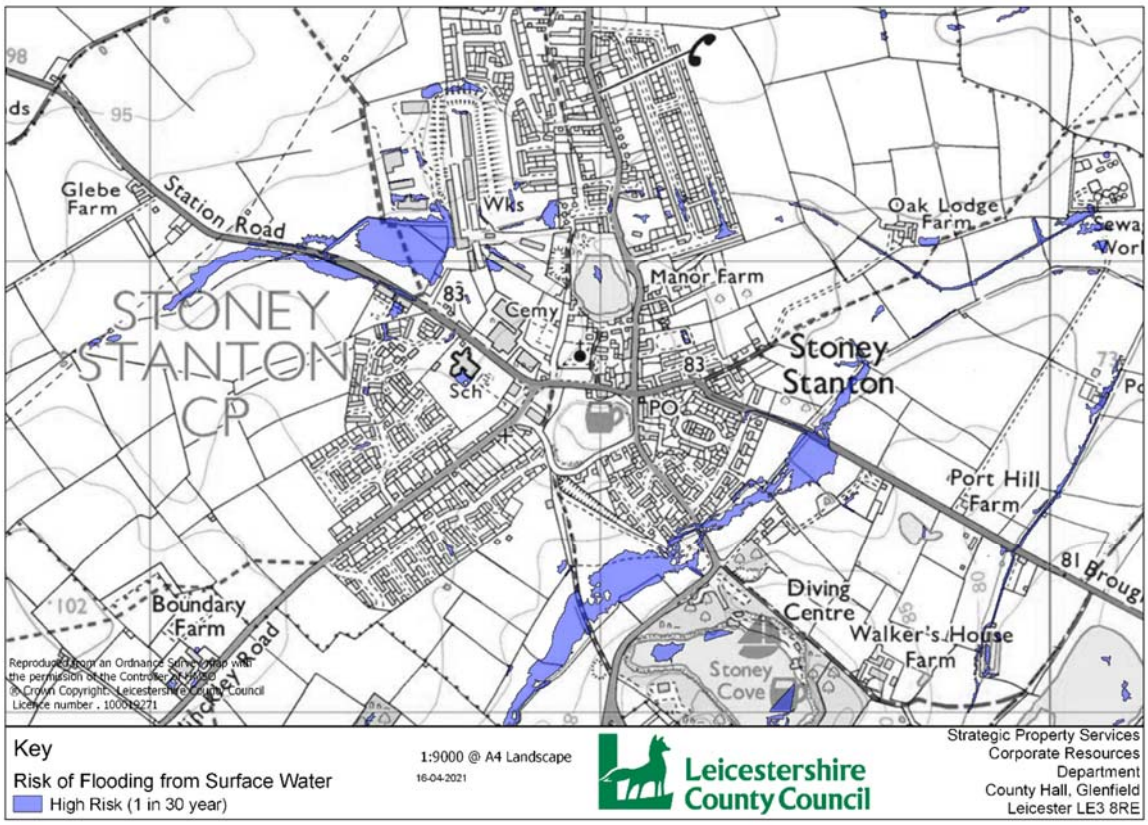


Figure 7: Surface Water Flood Map for Stoney Stanton (purple illustrates the predicted surface water flooding outline for a 1 in 30-year flood event).

Historic mapping

Historic mapping from the 1900's indicates a watercourse existed to the rear of the Mountsorrel Cottages (watercourse B) in the form of the continuation of a boundary field drainage system (Figure 9). This mapping also indicates the existence of two wells situated in land to the rear of the Mountsorrel Cottages. Good groundwater resources close to ground level are indicative of a naturally occurring high groundwater level, attributable to naturally occurring geologies and local topography. The presence of the wells may indicate that the location is subject to high groundwater levels and that the flooding event on 1st October 2019 may have been exacerbated by the groundwater levels of the area, limiting the infiltration potential of the natural geology and exacerbating surface water flow routes within the sub-catchment.

Figure 8: Historic map of Stoney Stanton indicating the likely watercourse to the rear of Mountsorrel Cottages and wells situated to the rear of the properties (Source: National Library of Scotland 1900's map).

Local development

Anecdotal reports suggest that the development opposite to Mountsorrel Cottages was a contributory factor to the flooding incident. The Council has reviewed details submitted to the Local Planning Authority (BDC) in relation to the development and completed post-development surveys to ensure the surface water drainage network on the development has been constructed as proposed.

As part of the planning process, the developer undertook surface water modelling to demonstrate that, in accordance with National Planning Policy Framework, the developed site would not be at an unacceptable risk of flooding and would not increase flood risk off site. As a part of the development, earthworks were completed to ensure that the developable area was outside of this area of flood risk and a flood compensation area was constructed to retain the functional flood plain capacity as a result of on-site earthworks to facilitate the development. After the flooding incident, an independent topographical survey was undertaken by the Council which confirmed that the attenuation basin and flood compensation area were constructed in accordance with the approved layout plans.

Anecdotal reports have suggested that prior to the Godfrey Close development, the land would regularly flood as water would run off agricultural fields towards the back of Mountsorrel Cottages and flood the highway. It would then follow a low point down a drop kerb and flood into the field which was originally lower than the highway. There is no responsibility for a development to resolve flooding issues from outside of the site. The source of this flood water does however require further investigation as the highway drainage is not designed to deal with surface water runoff from agricultural fields.

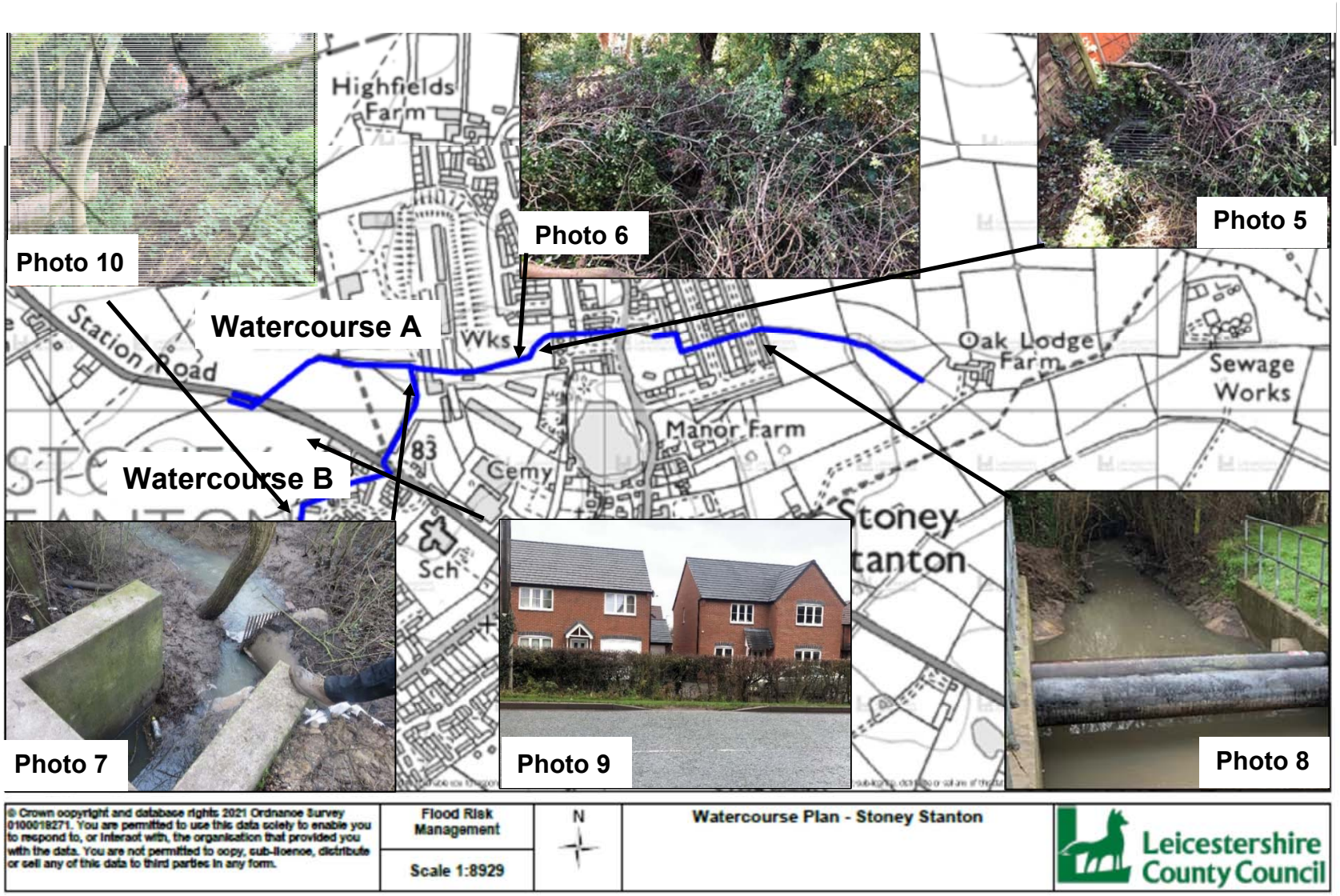
Site inspection and anecdotal reports

Following the flood event, surveying of relevant sections of drainage infrastructure was completed by various RMA's and various site walkovers were conducted. Through the course of these investigations, multiple inaccuracies between the drainage system and asset maps has been identified and site knowledge of multiple agencies has been established. It was identified that several local watercourses and key sections of drainage had become silted and overgrown with vegetation in multiple locations including:

- The trash screen at the culvert inlet adjacent to Meadow Close was found to be obstructed with debris after the flooding event (see Figure 9). This debris appears to have built up within the watercourse over an extensive period of time leading up to the flooding event. The open section of watercourse A in land upstream of the trash screen has also been identified to require maintenance as a result of vegetation growth and silt build-up (Figure 9). Despite the trash screen at the entrance culvert inlet being obstructed by debris at the time, water was described to have been able to make its way into the culvert via the top grating of the screen. Water was also described to have been exiting the culvert downstream at full capacity suggesting that the debris blockage of the screen was not the sole cause of the flooding at this location.
- The culverted section of watercourse A beneath Meadow Close (and downstream) was surveyed by STW in response to the flooding event. The surveying confirmed minor siltation was present within the culvert. However, no significant obstruction was identified, with reactive maintenance completed as a matter of course.
- Large sections of watercourse B have been found to be partially obstructed at various locations, with sections that had been completely filled in by riparian landowners. Various informal trash screens have also been identified along this section as previously mentioned in Section 2.2. The open chamber and 600mm upstream connection (opposite Mountsorrel Cottages) were also found to be partially buried due to silt deposition within the chamber and pipe.
- Following a review of on-site drainage on Godfrey Close, some inefficiencies in the on-site surface water drainage system were identified, including some failure of surface water runs and debris within private road gullies.
- Watercourse A (behind the Godfrey Close development) was identified to require some maintenance as a result of silt build-up and vegetation growth. However, flow was not significantly impeded at this location.
- Watercourse A (to the east of Abbot Drive) was identified to be flowing but requires some maintenance. Given the obstructions to the channel upstream of this, it is not thought that this had any effect on the flooding incident.
- Various elements of the highway drainage outside Mountsorrel Cottages, were found to be partially obstructed and/or requiring some maintenance. It was also identified that a highway connection which likely existed to discharge water into the pre-developed field (Godfrey Close) had become severed.

Leicestershire County Council

Figure 9: Summary of catchment features and obstructions within watercourse system during the flooding event.



There are many obstructions along the lengths of watercourse A and watercourse B which restrict/alter the flow of the watercourses including:

- Multiple informal trash screens that are not built to industry standards (as discussed in Section 2.2). This includes the junction of watercourse A and watercourse B where water is forced upstream before it can access watercourse A (refer to Photo 7).

- The restrictor plate located within watercourse A in the Foxbank Industrial Estate, downstream of the confluence of watercourse A and watercourse B (limited information is currently available on this structure).

- Fencing over sections of watercourse A (including upstream of Stressline).

- Piped sections of apparatus such as STW sewers, gas mains etc. Including at the most downstream sections of watercourse A (see Photo 8).

The impacts of the above obstructions are not fully understood and are required to be assessed further.

During a site walkover, a dropped kerb (as illustrated in Photo 9) was identified to be situated adjacent to the Godfrey Close development. Anecdotal evidence from the affected resident of Godfrey Close would suggest that surface water entered the development from Station Road, at this location, breaking the kerb line and running down the verge and through the hedge line before ponding outside the affected property. The water level reached a height that it eventually entered the property and externally affected the next-door property. The affected property is located lower than the highway (floor level of property is approximately 82.35mAOD and adjacent Station Road level is approximately 82.74mAOD) explaining why water pooled at this location. At the time of the internal flooding, it was anecdotally reported that the drainage on the driveway of the affected property required some maintenance.

Anecdotal reports of significant alterations to the public highway were reported to have contributed to the flooding. The camber of the road is such that water is tipped towards the gullies on the side of the highway outside of Mountsorrel Cottages. It was reported that ‘new kerb levels’ had contributed to the flooding on Godfrey Close. The area of resurfacing work that was completed in connection to the Godfrey Close development was very minor (around the access), and the Council holds no evidence of any other recent resurfacing works.

The Mountsorrel cottages are at a low point in comparison to the surrounding land and have thresholds lower than adjacent road levels, therefore increasing the risk of water entering the residential properties. Mountsorrel Cottages were reported to have initially flooded from the rear as a result of water shooting out of the chamber (opposite Robertson Close on Watercourse B), and also from overland flow off the fields to the rear of the residential properties. Water was also reported to have overtopped watercourse B and headed towards the cottages, likely due to a lack of capacity as well as a result of water backing up from informal trash screens. Further flooding was also described to have entered through the front of the cottages from Station Road.

Anecdotal reports indicate that properties in Mountsorrel Cottages have flooded previously from the rear during a more limited event in 2004, and additionally been subject to garden flooding in an incident in 1998. Both incidents were as a result of flooding from the rear of the residential properties only.

Site walkovers undertaken as part of this investigation indicate that over time residential gardens have encroached into watercourse B (refer to Photo 10). This limits the capacity of this watercourse to convey flow during flood events, thus resulting in more water likely to flow overland towards the Mountsorrel Cottages.

Reports received from residents indicate that land practices at Boundary Farm may be contributing to flooding in Stoney Stanton. As a part of this investigation, the Council has found no evidence to indicate that this is the case.

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 & Schools	Other Buildings	Roads	Critical Infrastructure
32	2	0	1<	0

Receptors impacted (number)

On 1st October 2019 a high intensity, short duration rainfall event hit the community of Stoney Stanton. This was following an extended period of un-seasonally high rainfall which had saturated the catchment. The ground was unable to absorb further precipitation causing the local drainage network to become overwhelmed.

1. Residential properties on Highfield Street and Meadow Close

In addition to the severe weather and the sheer volume of water that would have made its way into the local drainage systems, there are a number of factors which are likely to have contributed towards the extent of flooding at Highfield Street and Meadow Close including:

- The properties affected are located at a low point compared to the ground around it and thus water ended up flowing towards them.
- The trash screen on the culvert was obstructed thus water was retained locally and ended up flooding towards the low-lying properties.
- Watercourse A required maintenance and therefore its ability to contain water within the channel would have been reduced. It is thought that the vegetative channel would have slowed the flow towards the culvert and forced it to flood the land adjacent to it where it then flowed towards Highfield Street and Meadow Close. However, the culvert was already described to be flowing at maximum capacity during the flood event, and so the impact of this would have likely been negligible.

2. Residential properties (Mountsorrel Cottages) on Station Road

In addition to the severe weather, there are a number of factors which are likely to have contributed towards the extent of flooding on Station Road including:

- The properties are located at a low-point at the bottom of a large catchment, with agricultural land falling towards them. Property thresholds are also lower than adjacent road levels. Water thus flowed towards and into the properties as it had nowhere else to go.

- The highway infrastructure at Station Road was identified to require some maintenance at the time of the flooding. Parts of this infrastructure has also subsequently been identified to be damaged or misconnected. The highway drainage therefore would not have been functioning at maximum capacity. However, given the size of the event and the previous weather conditions, all drainage infrastructure would have been overwhelmed, and so the benefit of the highway drainage during this event would have been negligible. It is also worth noting that water was described to be entering the highway by form of surface water runoff from the agricultural fields, which the highway drainage is not designed to deal with. The source of this water needs to be further investigated.
- A short section of Watercourse B, upstream of the chamber where it meets the 600mm diameter pipe from Robertson Close, has been completely filled in. This reduced the amount of water that could have been conveyed within the channel, and the water subsequently flowed overland towards the low point (the properties) exacerbating the flooding around the back of the houses. It is likely, however, that there would have been negligible benefit if the watercourse had been fully functioning due to the other obstructions downstream and the sheer volume of water.
- Watercourse B was in places heavily silted and overgrown at the time of the flooding. It is, however, unlikely that if the watercourse had been operating at full capacity, this would have prevented the flooding incidents that occurred. This is because the volume of runoff from the rainfall event would have exceeded the capacity, therefore any level of watercourse maintenance would unlikely have had negligible benefit.
- There are various informal trash screens along the length of watercourse B that are not designed to industry standards. The exact impact of these obstructions needs to be further investigated.
- The natural geology and groundwater level would have likely contributed to the extent of flooding as the groundwater was likely high at the time, therefore reducing the potential for infiltration.
- The surface water chamber to the rear of Robertson Close is hydraulically inefficient, with a 600mm pipe entering the chamber perpendicular to the flow of watercourse B. It was reported that water flooded out of the open chamber at this location towards the Mountsorrel Cottages, further exacerbating the collection of flood water at the low point around the houses. The exact impact of this needs to be further investigated.
- Large sections of watercourse B are culverted and required some form of maintenance. Through the course of the investigation it has become clear that the complex and interacting drainage system downstream of Mountsorrel Cottages is not fully understood. The adequacy of this drainage requires further review, but it is possible that this may have contributed to the extent of flooding as water was unable to get efficiently away.

3.Single residential property on Godfrey Close – 1 Property (3 garages)

In addition to the severe weather, there are a number of factors which are likely to have contributed towards the extent of flooding on Godfrey Close including:

- The affected property is located at the lowest point on the Godfrey Close development and it is also lower than Station Road. The property has the lowest finished floor level of all the properties. Therefore, water which was collecting on Station Road (water which directly fell on the highway and additional water from the adjacent agricultural land), breached the drop kerb towards the property and the water entered the property.
- Inefficiencies in the on-site surface water drainage system were identified, including bellying of surface water drainage runs and debris within private road gulleys. Although given the sheer volume of water that was accumulating in this area, this would have likely had negligible benefit.

4. Manorfield Primary School, Smithy Farm Drive

Manorfield Primary School is located at a natural low point to the surrounding land and is identified to be at a high risk of surface water flooding (according to Environment Agency surface water flood maps – Figure 8). It is understood that the sheer volume of water that fell during the flood event simply exceeded the threshold of the temporary building that was affected.

5. Co-operative shop, New Road

The Co-operative shop store room (to the rear of the premises) is lower than the highway and the sheer volume of water breached the highway kerbing level and thus flowed towards the lowest point. As part of this investigation it was also identified that flooding had previously occurred affecting the store room in a similar manner.

In addition to the flooding on 1st October 2019, local residents have reported water quality and smell issues related to watercourse A. STW and the Environment Agency have investigated the matter and STW has completed maintenance to the dual 750mm culvert to remove accumulated solids within the system. The Environment Agency has been informed but has not requested any action or raised any concerns.

5. RESPONSIBILITIES

5.1. LEICESTERSHIRE COUNTY COUNCIL (LLFA)

As the LLFA, the Council has the responsibility to co-ordinate the management of flood risk and the interaction of RMAs 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.

5.2. BLABY DISTRICT COUNCL

Blaby 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.

5.3. ENVIRONMENT AGENCY

The Environment Agency has a strategic overview responsibility under the FWMA as well as permissive powers to carry out maintenance work on Main Rivers under Section 165 of the Water Resources Act (WRA). Main Rivers include all watercourses indicated on the statutory Main River maps held by the Environment Agency and the Department of Environment, Food and Rural Affairs. This includes any structure or appliance for controlling or regulating the flow of water into, in or out of the channel.

The Environment Agency has permissive powers to carry out works of maintenance and improvement on these rivers. These powers can be used to undertake works to reduce flood risk where landowners fail to undertake their responsibilities under the WRA.

The Environment Agency can undertake enforcement action where third-party asset owners fail to maintain their property/land in appropriate condition. They may consider undertaking maintenance or repair of third-party assets in order to safeguard the public interest and where other options are not appropriate.

5.4. LOCAL HIGHWAY AUTHORITY (LCC)

As LCC has the role of local highway authority, they have a duty to maintain the Highway under Section 41 of the Highways Act (1980). Section 100 states that LCC also has the responsibility and power to prevent water running onto the highway from adjoining land. Refer to the Useful Links section of the report for further information on the Highways Act (1980).

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. RIPARIAN LANDOWNERS OF WATERCOURSES AND HOMEOWNERS

As detailed within the Environment Agency document 'Living on the Edge', 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 in the Environment Agency publication, "Living on the Edge".

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.

6. AGREED ACTIONS

6.1. LEICESTERSHIRE COUNTY COUNCIL (LLFA)

Leicestershire County Council has agreed/ undertaken the following:

- To coordinate all actions relating to this formal flood investigation and keep all partners and the local community up to date with progress, including supporting the local flood action group.
- To continue to work with residents and other RMAs to ensure that riparian landowners are fully aware of their maintenance responsibilities for watercourses.
- Provide support and guidance to affected residents or businesses (including the local school) where possible, including distributing copies of the Councils Guidance Notes.
- Commissioned an integrated flood modelling study assessing flood risk from all sources in order to gain a greater understanding of the nature and mechanisms of flooding in Stoney Stanton. This will include more detailed surveying on key drainage infrastructure. As a part of this study, it is proposed that multiple mitigation options will be assessed to help reduce future flood risk in Stoney Stanton. This study will where possible seek to address the flooding to the school and address the water quality issues identified as part of this report.
- To identify any key drainage assets that have a significant impact on flood risk for inclusion on the Council's Flood Risk Asset Register (where appropriate).
- To consult with the Parish Council, Flood Action Group and flood warden to update the existing flood action plan where appropriate.

6.2. LEICESTERSHIRE COUNTY COUNCIL (LOCAL HIGHWAYS AUTHORITY)

Leicestershire County Council has agreed/ undertaken the following:

- To continue to work collaboratively with all RMAs to progress the investigation into the flooding to understand the event of the 1st October 2019 (and the subsequent flood events) to help mitigate any future flooding.
- Completed extensive reactive cleansing of the highway drainage network on a number of occasions. To continue follow-up highway drainage works within Station Road as and when appropriate.
- To implement a highway drainage improvement scheme on the B581 (Station Road) to mitigate flood risk associated with the highway network.
- Investigate the need of the drop kerb on Station Road and consider remedial works if appropriate.

6.3. SEVERN TRENT WATER

Severn Trent Water has undertaken/agreed the following actions:

- To continue to work collaboratively with all RMAs to progress the investigation into the flooding to understand the event of the 1st October 2019 (and the subsequent flood events) to help mitigate any future flooding.
- Completed various activities of cleansing and CCTV surveying of watercourse A and various sections of their network around the village.
- To continue to engage with the Environment Agency and BDC regarding the water quality concerns raised as part of the investigation.

6.4. PRIVATE RIPARIAN LANDOWNERS, FLOOD ACTION GROUP AND LOCAL COMMUNITY

Following the flooding event of 1st October 2019, the Stoney Stanton flood action group have undertaken works to cleanse sections of surface water drainage network and are proposing to continue to monitor watercourses and drainage infrastructure in the area. This role will additionally include supporting the Council with engaging with key local landowners/riparian landowners. The flood action group should also consider reviewing the current community flood plan in collaboration with the Council.

6.5. BLABY DISTRICT COUNCIL

Blaby District Council has agreed and/or completed the following actions:

- To continue to work collaboratively with all RMAs to support the investigation into the flooding to understand the event of the 1st October 2019 (and the subsequent flood events) to help mitigate any future flooding.
- Play a key role in the immediate aftermath of the flooding incident, coordinating the community response. A collaborative workshop between the response officers at BDC and the Parish Council took place after the event to update the emergency plan that is now in place. Additional flood warden training was provided to a Parishioner and the Flood Action Group now have a plan in place for weekly inspections of the watercourse.
- Conducted emergency reactive maintenance to the watercourse A, trash screen and culvert adjacent to Meadow Close as a gesture of goodwill given the severity of the flooding. **NB: this watercourse is not owned or maintained by BDC.** BDC is **not responsible** for the maintenance of watercourses, trash screens and culverts on land that it does not own.
- Looked at a number of relevant aspects of the Godfrey Close development, as and when raised, during the course of the investigation. This has brought to light a number of minor discrepancies, which have been raised with the developer and the investigating authority; however, none of these are concluded to constitute a breach of planning control
- To support STW with the engagement with the Environment Agency regarding the water quality concerns.

6.6. INDIVIDUAL HOMEOWNERS

Local residents and tenants who are aware that they are at risk of flooding can take action to ensure that their properties are protected. 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.

7. SOURCES OF INFORMATION

The following documents, reports, records or sources of information have contributed to this report:

- Correspondence received from residents affected by flooding in Stoney Stanton.
- Site visits conducted by the Council.
- Meetings with the elected County Councillor for Stoney Stanton.
- Flood Forecasting Centre and Met Office statements and warnings.
- Independent survey of surface water drainage infrastructure installed on Godfrey Close development commissioned by the Council.

8. STATUS OF REPORT AND DISCLAIMER

This report has been prepared as part of the Council's responsibilities under the FWMA.

The findings of the report are based on a subjective assessment of the information available by those undertaking the investigation and therefore may not include all relevant information. As such it should not be considered as a definitive assessment of all factors that may have triggered or contributed to the flood event.

The opinions, conclusions and any recommendations in this report are based on assumptions made by the Council when preparing this report, including, but not limited to those key assumptions noted in the report, including reliance on information provided by others.

The Council expressly disclaims responsibility for any error in, or omission from this report arising from or in connection with any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the time of preparation and the Council expressly disclaims responsibility for any error in, or omission from, this report arising from or in connection with those opinions, conclusions and any recommendations.

The Council does not accept any liability for the use of this report or its contents by any third party.

Glossary

Acronyms / Term	Definition
EA	Environment Agency
FWMA	Flood and Water Management Act 2010
LCC	Leicestershire County Council
LDA	Land Drainage Act 1991
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