Flood Investigation Report

Flooding at Kibworth Harcourt & Kibworth Beauchamp
(Kibworth)
20th July 2021

Final Report

May 2024

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

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1. EXECUTIVE SUMMARY

Kibworth Harcourt and Kibworth Beauchamp experienced a localised intense flood event on the 20th July 2021. The storm resulted in a large quantity of rain in a short period of time. Drainage systems and watercourses became overwhelmed and unable to cope with the volume of water that fell in such a short time. As a result, water entered and damaged four residential properties, two schools and a care home. Damage to buildings, cars etc was also reported as a result of the hail that fell during the event (reported to be the size of golf balls). In parts of Kibworth Harcourt and Kibworth Beauchamp, sewage was also reported to have contaminated flood waters. A range of actions have been proposed as a result of the conclusion of this flood investigation to help mitigate future flood impacts.

1.1 SUMMARY OF FLOOD SOURCES

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

1.2 RECEPTORS IMPACTED (NUMBER)

Residential	Business	Other Buildings	Roads	Critical Infrastructure
4	3 (1 care home and 2 schools)		1	

2. INTRODUCTION

2.1 SECTION 19 INVESTIGATIONS – DUTY TO INVESTIGATE

Section 19 of the Flood and Water Management Act (FWMA) states:

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

a. *which Risk Management Authorities (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."*

2.2 FORMAL FLOOD INVESTIGATIONS CRITERIA

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 thresholds in table 1 occurs as a result of a flooding incident.

The locations detailed in this report includes Kibworth Harcourt and Kibworth Beauchamp which from herein will be referred to as *'Kibworth'.*

A formal investigation into the flood incident in Kibworth on the 20th July 2021 has been undertaken as the event triggered the locally agreed flooding characteristics or discretionary items as indicated below:

Table 1: Locally Agreed Criteria for Formal Flood Investigations

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	☐

2.3 RISK MANAGEMENT AUTHORITIES (RMAS)

The following RMAs were identified as relevant to the flooding in Kibworth:

- Leicestershire County Council – LLFA
- Leicestershire County Council – Local Highways Authority
- Harborough District Council
- Anglian Water Services Ltd - Statutory undertaker for public wastewater and freshwater assets
- Network Rail - owner, operator and developer of Britain's railway infrastructure
- Environment Agency

3. FLOOD INVESTIGATION

3.1 LOCATION AND SETTING

Kibworth is comprised of two civil parishes, Kibworth Beauchamp and Kibworth Harcourt, which are situated within Harborough District Council and located approximately 13km south-east of Leicester City. The land surrounding Kibworth falls to the south-east, with land to the north and south-west of the parishes having a higher elevation.

The flooding event which occurred on 20th July 2021, impacted five key parts of Kibworth including:

1. Kibworth Primary School
2. Church Road and Station Hollow
3. Kibworth Mead Academy and Kibworth Court Care Home
4. The Lea and Brookfield Way
5. Langton Road

These five flood impact areas are indicated on Figure 1 below.

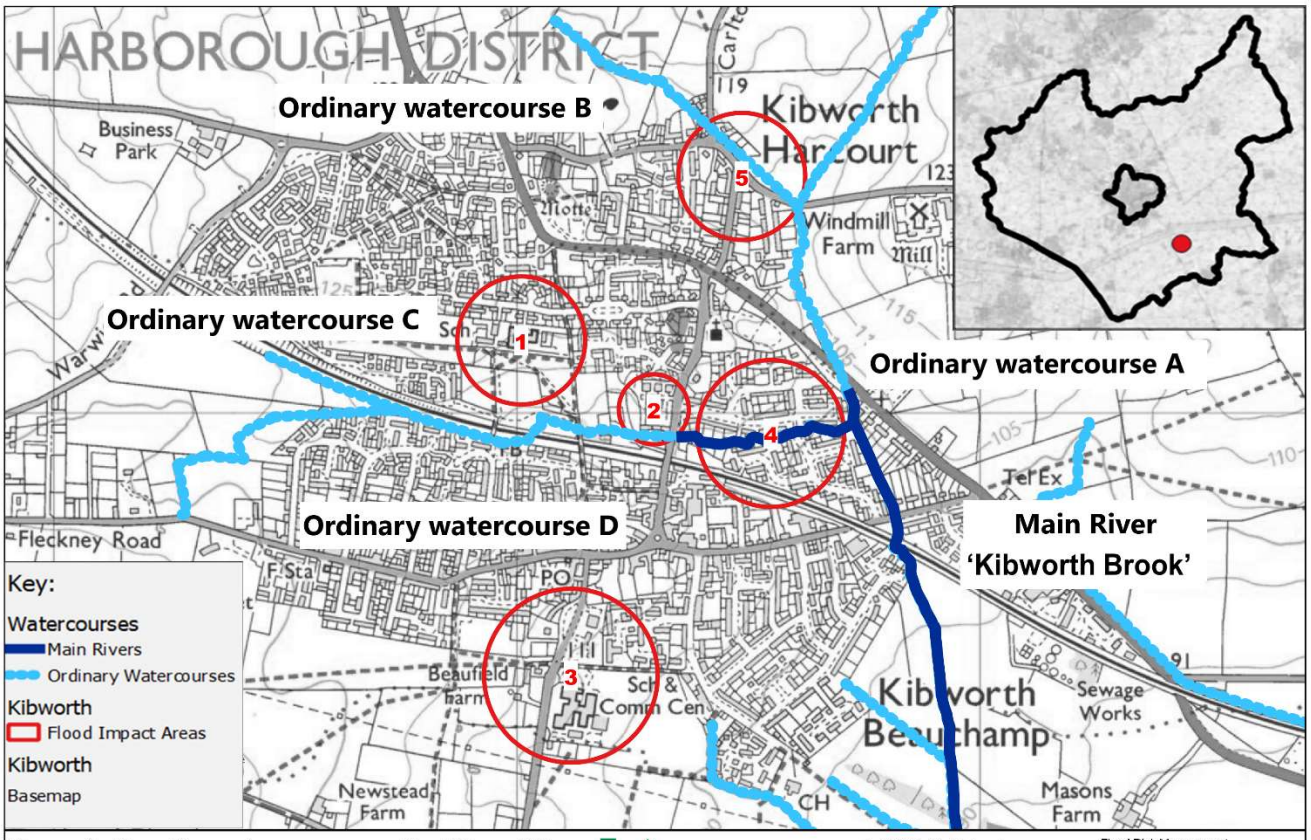

Figure 1: Flood impact areas across the Kibworth's

3.2 LOCAL DRAINAGE

There is a complex network of watercourses that serve Kibworth. Figure 1 illustrates the Main River (dark blue, known locally as the Kibworth Brook) and the network of minor local watercourses (light blue, classified as ordinary watercourses) which flow through Kibworth.

The land located to the north of Kibworth Harcourt drains into ordinary watercourse A which travels in a southerly direction. Ordinary watercourse A is culverted at points across its length before it joins the Kibworth Brook. Ordinary watercourse A converges with ordinary watercourse B at ordnance survey national grid reference OSNGR 468613, 294439. Ordinary watercourse B flows in a south eastly direction through flood impact area 5. For the first 0.5km of this watercourse, it is open through agricultural fields before entering a culvert to the east of Carlton Road. The culvert is believed to then travels under Albert Street and Windmill Gardens before converging with ordinary watercourse A. A small ditch exists to the north of the affected property in flood impact area 5. This ditch appears in open channel and is culverted for access for a range of properties before converging with ordinary watercourse A. It is not known where this originates but it could be linked to ordinary watercourse B.

Located to the west of Kibworth is Ordinary Watercourse D (as illustrated on Figure 1) this watercourse flows in an easterly direction just to the south of two flood impact areas. This watercourse drains water from the surrounding housing estates, and agricultural fields. Ordinary watercourse D issues as an open watercourse at OSNGR 467279, 293786. Ordinary watercourse D travels in a north-easterly direction to converge into ordinary watercourse C at OSNGR 467733, 294023 from this point they run in an easterly direction in a culvert travelling parallel to the railway. Ordinary watercourse C emerges as an open watercourse at OSNGR 467975, 293941 where the open watercourse culverts under the railway to emerge north of the railway. This then continues to run in an easterly direction towards Station Hollow before culverting through approximately three 350mm diameter pipes for around 25m (anecdotal information). Ordinary watercourse C then becomes open again to the south of homes on Station Hollow before culverting again under Church Road/Station Road at OSNGR 468321, 293971. Following this, it joins the main Kibworth Brook which runs east at the rear of properties on Rectory Lane at OSNGR 468353, 293955 and continues to flow in an easterly direction.

The Main River, which is known locally as the Kibworth Brook, flows directly through flood impact area 4 starting at OSNGR 468353, 293955 at the rear of Rectory Lane. This Main River is an open watercourse allowing water to drain from the surrounding urban area running between residential properties culverting under a public right of way on Brookfield Way. The Kibworth Brook travels easterly towards the A6 Harborough Road before heading south at approximately OSNGR 468715, 293984. The Kibworth Brook continues to flow south towards Grange Farm, joining the Langton Brook at OSNGR 470451, 292224.

The public highway drainage network in Kibworth is maintained by the Council who is responsible for highway drainage assets such as road gullies that fall within the adopted highway extent.

The villages are served by a public sewer network comprised of a foul, surface water and combined sewers maintained by Anglian Water. Multiple surface water outfalls and combined sewer overflows (CSO's) discharge into the ordinary watercourse network at various locations. One outfall located at OSNGR 468605, 294448 outfalls into Ordinary Watercourse A draining surface water from the surrounding houses including those located in flood impact area 5. Another foul sewer discharges off Meadowbrook Road around OSNGR 467981, 293940 into ordinary watercourse C during storm events.

4. FLOODING INCIDENT ON 20TH JULY 2021

4.1 PRIOR TO THE EVENT

Previous Incidents

The Council holds a suite of data relating to flooding incidents in Leicestershire obtained from various sources. However, the information held is limited prior to the establishment of the Council as the Lead Local Flood Authority (prior to 2010). Prior to the events of the 20th July 2021, the Council was aware of one previous flooding event in July 2013 affecting a property in flood impact area 5 on Langton Road. At the time, the Council installed additional highway gullies on Langton Road in an attempt to address the flooding in collaboration with Anglian Water. Three flooding events occurred in 2004, 2010 and 2017 on the Lea in flood impact area 4 of which the Environment Agency was aware of.

Preparedness

A community response plan has been prepared for Kibworth which outlines the points of contacts and emergency support facilities in the event of flooding (amongst other emergencies). The plan is only enacted when a threshold is triggered; this includes when there is prolonged period of heavy rainfall or if the Met Office issues a severe weather warning. Neither of these triggers occurred to enact the community response plan therefore, Kibworth were relatively unprepared for the flood event.

Catchment Conditions

In the days prior to the event the catchment conditions were relatively dry and consistent. According to the Met Office, much of the UK, including the East Midlands, experienced clear skies and high temperatures[3]. On the morning of the 20th July 2021 the catchment experienced settled conditions, skies were clear, and temperatures were high. However, towards the afternoon, the UK experienced some unsettled conditions. As a result, the Met Office issued a Yellow Warning to most of the East Midlands and the South-east of England as thunderstorms were expected between 13:00 and 23:59[1].

[1] https://digital.nmla.metoffice.gov.uk/IO_e1590e18-5408-434d-8804-2b5afef45a59/

4.2 FLOOD EVENT

On the afternoon/early evening of the 20th July 2021 Kibworth experienced a localised severe rainfall event; it was reported that five weeks' worth of rainfall fell in only 90 minutes[2]. Data collected from the rain gauges (provided by the Environment Agency) in Kibworth evidenced that on the 20th July 2021 72mm of rain fell between the hours of 16:30 and 18:15. Of the 72mm of rainfall, 71.8mm fell in a 75-minute period. This can be described as a 'violent event'[3]. The event that took place in Kibworth was localised as rain gauges located to the southeast of Kibworth only recorded 28mm of rainfall on the 20th July 2021 according to the Shoothill Gauge Map[4]. The unstable air mass which resulted in the flooding also delivered hail stones reported to be the size of golf balls[4].

As the flood impact areas, shown in figure 2, were flooded by different mechanisms, they are discussed below independently.

1. Kibworth Primary School (1 Property)

The local primary school flooded primarily due to surface water. Reports detail that surface water ran from the carpark and playgrounds of the primary school and entered into the classrooms as surface water levels surpassed the thresholds of the doorways. Water was also described to have flowed down the access road to the school which tips steeply down towards the front of the building. It then entered via low thresholds associated with the access point to the school kitchen. Internal flooding of the school was also exacerbated by roof damage to two classrooms and the hall, also the large hailstones caused damage to the roof of the library, allowing rainfall to ingress internally through the damage.

2. Church Road and Station Hollow (1 Residential Property and various external properties)

Surface water was described to have originated to the west of the houses running off fields located to the east of Barnard's Way and south of the Primary School towards a water balancing pond and the watercourse. Water also ran off St Wilfred's Close down a relatively steep incline, see Photographs 1 and 2, through a field towards ordinary watercourse C. Ordinary watercourse C was described to back up and overtop during the storm event and added to the surface water flooding. Residents reported that the watercourse did not come out of channel where the watercourse culverts under Church Road, it was described to come out of channel in the field shown in photograph 2 and then ran over land with other surface water flows towards properties. Residential properties in flood impact area 2 suffered internal and external flooding. It was reported that as the flood water rose, it seeped through the air bricks and through the threshold of one residential property with internal flood waters reported to have reached around 6''. It was reported that efforts were made to redirect the flood water back into ordinary watercourse C at the rear of the garage of the internally affected property to reduce the volume of flood waters internally. The Victorian sewage network along Meadowbrook Road to the south of the railway line was also reported to have surcharged foul waste which contaminated and added to the flood waters.

[2] https://www.gaugemap.co.uk/

[3] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/library-and-archive/library/publications/factsheets/factsheet_3-water-in-the-atmosphere.pd

[4] https://www.kibworthvillage.co.uk/museum/item/89-the-great-kibworth-hailstorm-july-2021.html

Photograph 1: St Wilfrids Close in 2009 showing gradient down to field

Photograph 2: Field at bottom of St Wilfrids Close showing steep drop of field to watercourse C

3. Kibworth Mead Academy and Kibworth Court Care Home (2 Properties)

Water was described to run off the highway and also quickly pool on the surface of the car park of the local care home and built up to such a depth that it eventually breached the threshold of the property resulting in internal flooding and as a result residents were moved from the ground floor level of the care home.

Kibworth Mead Academy was also impacted by surface water runoff. Water was described to run off the fields to the West and off the access road to the local health centre. It reportedly travelled across the highway (Smeeton Road) and down a very steep gradient towards the west of the school buildings and also down the southern access of the school towards the maths building. This water breached the thresholds of the school, allowing water to enter internally, damaging classrooms. Water was also described to fallen within the school grounds and entered via thresholds lower than the surrounding ground.

4. The Lea and Brookfield Way (2 Residential Properties)

Surface water was described to have covered the road surface and travelled down Church Close. It then flowed down Rectory Lane and The Lea where it ran between houses in the south-east corner of The Lea as the waters attempted to reach the Kibworth Brook. The depth of the flood water was high enough to breach the property thresholds of one residential dwelling on The Lea with waters reaching ankle depth covering the carpets and skirting boards.

On the southern side of the Kibworth Brook, water was also reported to have been overtopping the banks and heading into property gardens on Brookfield Way. This water flooded many gardens but also overtopped the threshold of one residential property and entered through the rear of the property as illustrated in Figure 4.

Residents on Rookery Close also requested sandbags from the Council due to water running off the railway embankment towards properties. It is understood that properties in this area suffered external flooding to gardens.

5. Langton Road (1 Residential Property)

Surface water was described to travel down the highway from the top of Marsh Drive towards residential properties and driveways at the corner of Langton Road (Figure 2). Water which collects at the low point on Marsh Drive travelled through gardens towards the rear of the internally flooded property. Water also overtopped the ditch adjacent to the property and ran towards the private drive of one residential dwelling into the front perimeter of the property. Water was also reported to have surcharged from an Anglian Water inspection chamber located in the driveway of the same property on Langton Road. This water combined with the highway/surface water and entered the property internally via air bricks and the property threshold.

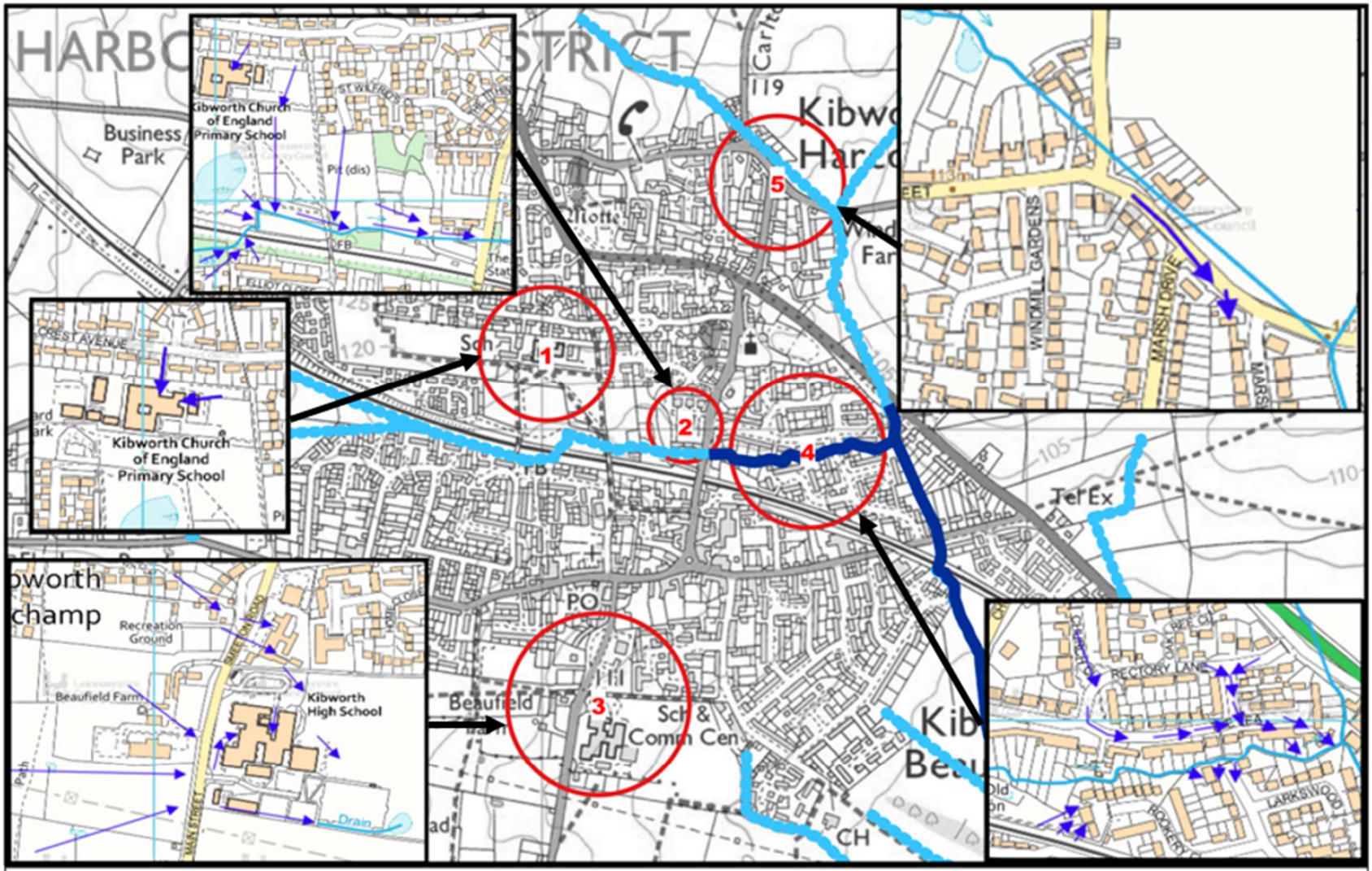

Figure 2: Flood water flow paths

Leicestershire County Council

1:10000 @ A4 Landscape

Flood Risk Management
Infrastructure Planning
County Hall, Glenfield
Leicester LE3 8RE

Figure 3: Pictures of flood impact areas

4.3 POST FLOOD EVENT

Once aware of the flood event, LLR Prepared (the Local Resilience Forum – a multi-agency partnership of category 1 responders for emergency situations) called both Kibworth Parish Clerks to check details in the emergency plan at approximately 8pm. Leicestershire Fire and Rescue Service attended emergency calls to help pump and divert flood waters away from residential properties. It is understood that no residents had to be temporarily rehoused, however some elderly residents in the affected care home had to be moved upstairs away from flood water damage.

The Council received a number of 'gully blocked' and flooding reports over the next few days and notified other RMAs. The Council attended various sites across Kibworth on the 21st July 2021 to ensure the highway drainage network was functioning correctly.

Following the flood event, the Council conducted a review of all available data to gather further information relating to the event. The Council also spoke with the affected residents and flood report forms were issued to help understand the sources of flood water. Meetings with relevant RMAs were also held to share available information.

Post flood report forms detailed that no flood defences were deployed by residents who owned them at the time of the event due to the unexpected and rapid flood waters.

Data Analysis

Fluvial (River) Flood Risk

Figure 4 shows the Flood Zones associated with the watercourse. Flood Zone 3 shows the area that could be affected with a 1 in 100 (1%) or greater chance of happening each year. Flood Zone 2 shows the extent of an extreme flood from rivers with up to a 1 in 1000 (0.1%) chance of occurring each year.

All flood impact areas are located within fluvial Flood Zone 1 apart from flood impact area 4 which lies within in Flood Zones 2 and 3. These are based on long term flood risk maps published on www.gov.uk/check-long-term-flood-risk. The fluvial flooding that occurred on 20th July 2021 in flood impact area 4 is as predicted.

Please note that Flood Zones represent the potential risk of flooding directly from the watercourse only. They do not represent the total risk added from other sources. Although other ordinary watercourses, drainage channels and culverts may be present in the vicinity of Kibworth, the Council do not hold any further records.

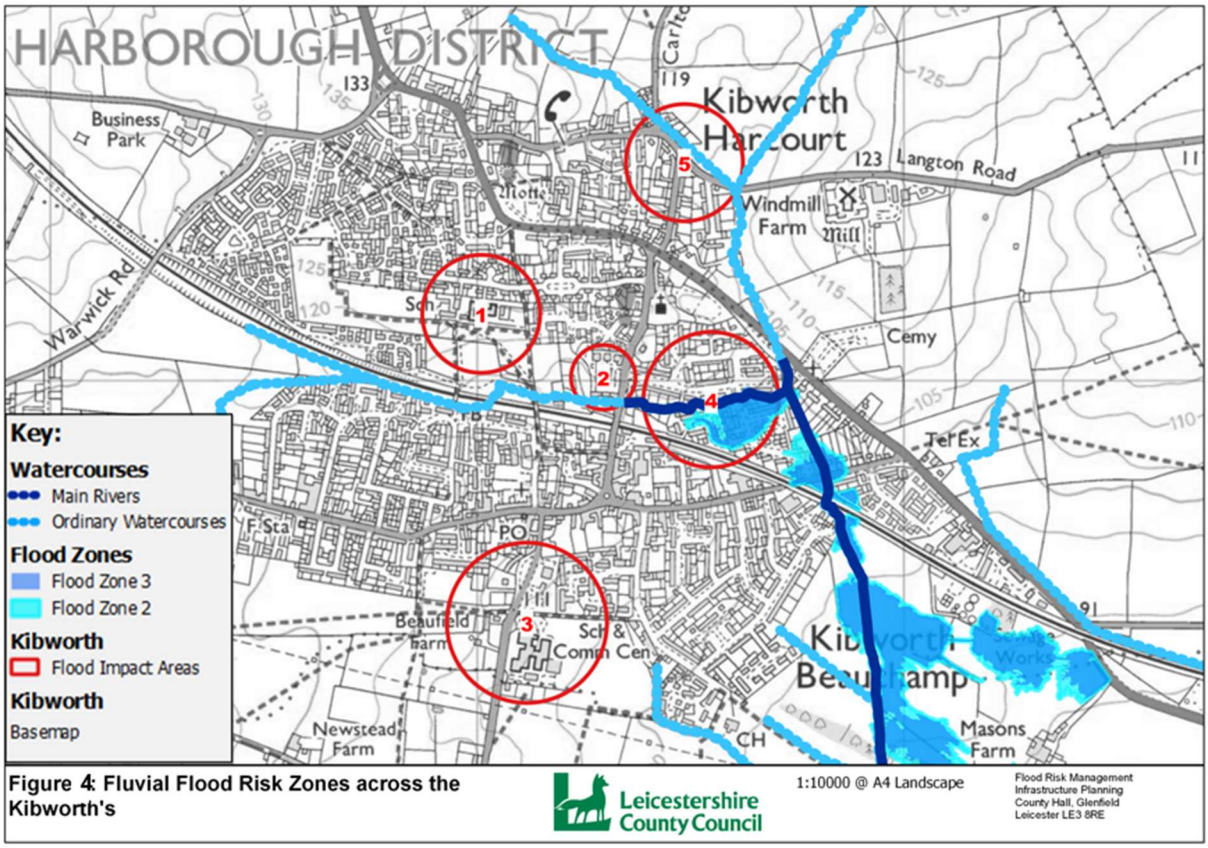

Figure 4: Fluvial Flood Risk Zones across the Kibworth's

Surface Water Flood Risk

A map of the risk of flooding from surface water (Figure 5) has been produced by the Environment Agency (EA), published on www.gov.uk/check-long-term-flood-risk, using high level modelling which represents where water could flow and accumulate during certain rainfall events[5]. Following a review of this mapping it is understood that significant parts of Kibworth are susceptible to surface water flooding including the areas affected during the storm on the 20th July 2021. The extent of surface water flooding in each flood impact area and the affected properties identified during the event on 20th July 2021 are largely consistent with the surface water flood model extents and flow paths identified in Figure 5 further supporting the theory that surface water was largely the source of flooding during this flood event.

However, there is one discrepancy identified between the surface water flood risk map and flood impact area 1. Figure 5 indicates a low risk of flooding from surface water in this impact area. This does not correlate with the anecdotal information collected from the local community as it is understood this flood impact area suffered primarily from surface water flooding from the car park.

The modelling is high level (not designed to be accurate at the local level) and was completed in December 2013. The modelling also does not consider property threshold levels, and therefore cannot accurately predict internal flooding. It is also understood that the school in flood impact area 1 flooded as a result of damage to the

[5] https://check-long-term-flood-risk.service.gov.uk/map?easting=468602&northing=293971

roofs of the building caused by hailstones and this would not have been picked up by the model.

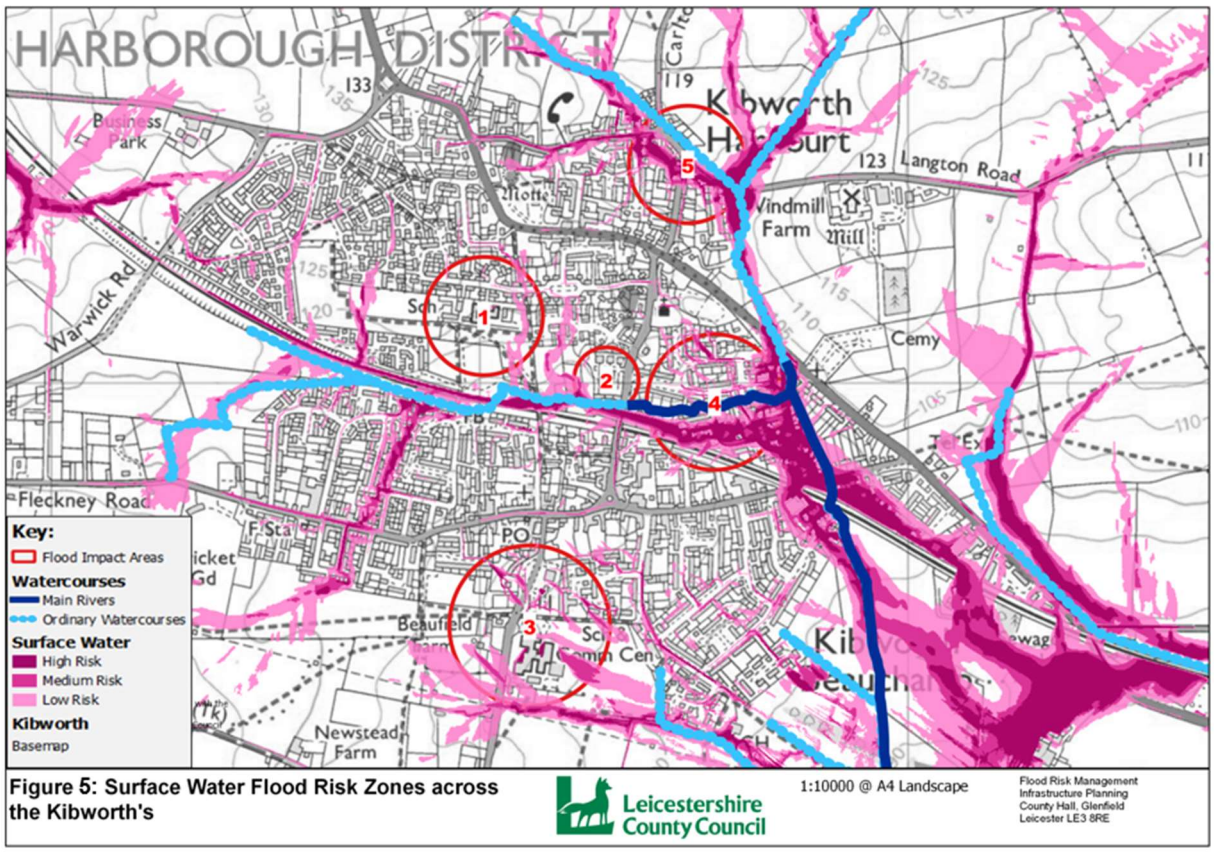

Figure 5: Surface Water Flood Risk Zones across the Kibworth's

Site inspections and anecdotal reports

The site inspections and collation of incident reports sought to understand the cause of the flooding event in each flood impact area. Local reports identified that Kibworth experienced an extreme intense downpour and abnormally large hail stones which caused property damage leading to insurance claims for both vehicles and properties. The localised location of the storm came to light as the Garden Centre on Fleckney Road to the west of Kibworth Beauchamp was missed completely by the storms.

1. **Kibworth Primary School**

The collation of information following the event determined that there was damage to many classrooms and other teaching facilities for the school. Several classrooms required new carpets and other furnishings throughout which would have impacted the use of these facilities; however the impacts were slightly lessened due to the storm occurring outside of operating school term time. Anecdotal reports suggest as well as surface water causing internal flooding, large hailstones caused damages to roofs, especially the library allowing rainwater to enter the building. It was also determined that this was not the first flooding incident to have impacted the school.

2. **Church Road and Station Hollow**

This flood impact area was anecdotally reported to have been affected by surface water travelling from land to the north-west of Station Hollow, over fields and from the water balancing pond.

It was anecdotally reported that ordinary watercourse C backed up and overtopped its banks before the watercourse culverts underneath Station Street/Church Road during the flood event. This could be attributed to a capacity issue due to the sheer volume of water or due to a blockage/defect within the culvert. No blockages were reported to the Council at the time of the flooding incident. The Council has reviewed internal data sets and identified that a contractor on behalf of Network Rail applied for ordinary watercourse consent to reline the culvert under Station Street/Church Road in August 2020 following signs of failure. It is understood that works were completed to reline the culvert to rehabilitate the structure for another 100 years in October 2022. It is possible therefore that there may have been defects within the culvert that exacerbated the flooding, but it is not known to what extent. The culvert would not have been designed to take such high flow volumes and given the intensity of the storm it is unlikely that any defects would have been the sole cause of the flooding.

This area was also anecdotally reported to be affected by waters contaminated with sewage. It is understood the Fire and Rescue Service attended site and pumped water away from residential properties to prevent internal property flooding. The Fire and Rescue Service reported contaminated waste within the water that was pumped away from the properties. It was reported that a foul sewer south of the railway on Meadowbrook Road became overwhelmed and spilled into ordinary watercourse C. This system is reported to regularly overtop in storm conditions and discharge directly into ordinary watercourse C. This storm overflow is in line with Kibworth Railway Bridge Sanitary Sewer Overflow Discharge Permit agreed with the Environment Agency.

It has been anecdotally reported that during the flood event, the volume of water could not be regulated by the control chambers in the balancing pond and that the pond was not well-maintained causing excessive amounts of water to be discharged into ordinary watercourse C. There was no evidence provided that could substantiate this claim. It has been reported that David Wilson Homes Ltd sent representatives to check the outlets from the balancing ponds three months after the event to which they were reported to be functioning as expected. It has also been anecdotally reported that this balancing pond was adopted by Anglian Water following the flood event in July 2021 and has since been regularly maintained with no further reports of issues since.

Based on the lack of evidence available at the time of writing this report, it is not possible to link the balancing lagoon to the flooding at this flood impact area (2) and therefore it is believed that ordinary watercourse C was overwhelmed by the sheer volume of water and speed of the storm event, rather than excessive flows from to the balancing lagoon which was possibly not fully functioning or malfunctioning.

Further information also suggest that rainwater ran from St Wilfrids Close over agricultural land into ordinary watercourse C. It is clear from the site visit that land slopes towards the watercourse steeply and therefore any surface water run off could easily find its way into ordinary watercourse C during high runoff events, such as the event in July 2021.

Through engaging with the local community there have been anecdotal reports that Station Hollow was historically quarried for sand and gravel linked to the railway. The properties in this vicinity sit at a low point compared to surrounding land and thus making them more susceptible to flooding. The extension of the railway at Station Hollow can be seen in historical mapping as shown in Figure 6.

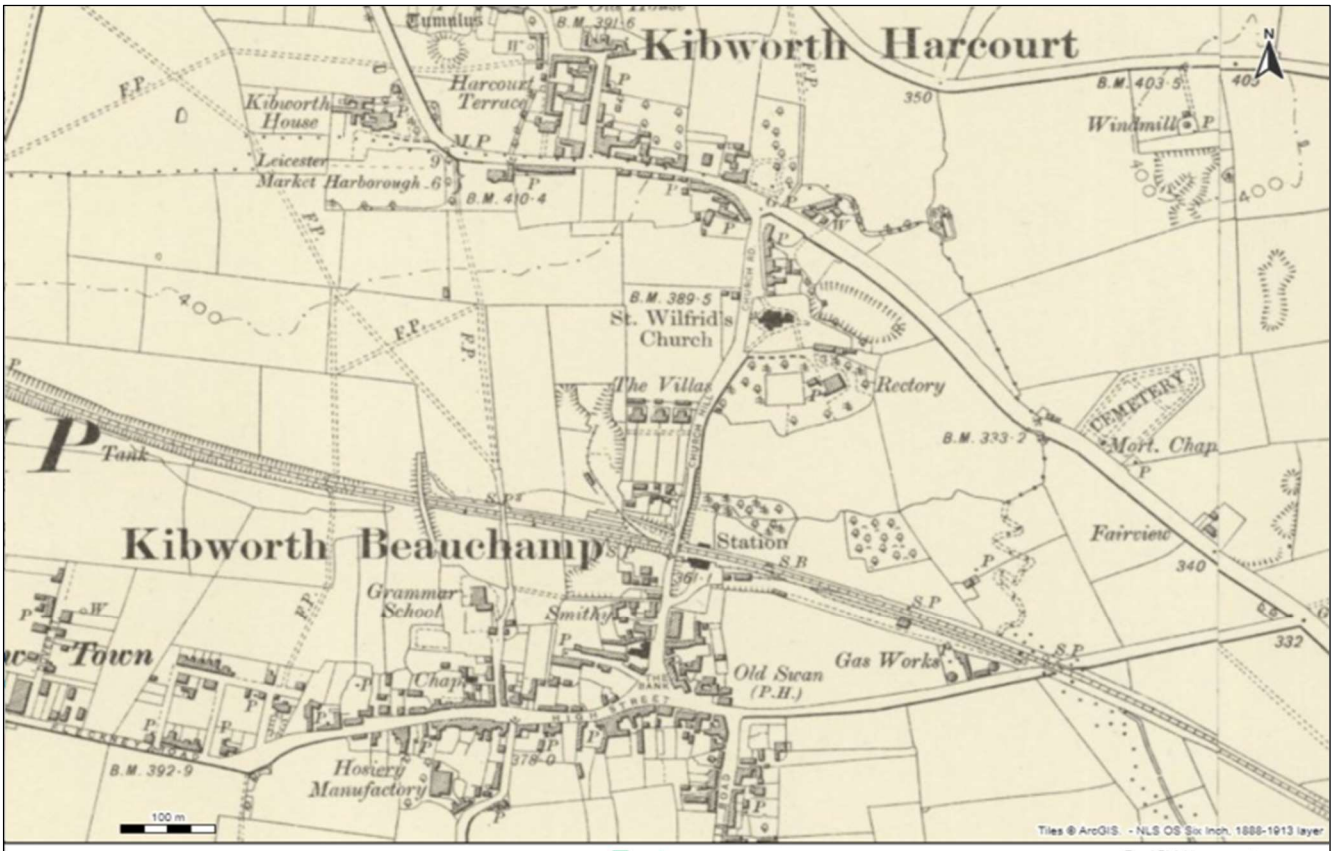

Figure 6: Historic map of flood impact area 2

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1:5000 @ A4 Landscape

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3. Kibworth Mead Academy and Kibworth Court Care Home

Following the event, it was discovered that this area had previously been affected by flooding; however, this was not reported to the Council. Kibworth Mead Academy had previously tried to investigate this issue and commissioned a land height survey a few days prior to the event themselves. Reports detail that the height of the surrounding land influenced the volume and speed of surface runoff. Water travelled downhill towards the school and breached internal thresholds. The sheer volume and intensity of the rains from the storms meant that rainfall did not have chance to infiltrate the ground, but rather ran overland from higher to lower land and into the school.

It is also noted that a South Leicestershire Medical Practice which was constructed in 2017 is located directly opposite Kibworth Mead Academy. This development has increased hard standing surface and only one apparent gulley to drain the site access, these factors combined with land falling to the east, it appears that water is channelled towards Kibworth Mead Academy.

It is not known what condition the private drainage system of the care home was in prior to the event or the discharge point of this system, and it is possible there may have been some defects in the system. However, given the intense nature of the storm, it is very unlikely that the system would have coped with the sheer speed and volume of water that fell. Drainage systems are not typically designed to cope with such extreme rainfall events. The Council also inspected highway drains in the vicinity of the care home following the flooding and found them to be running. Therefore, it is thought that the intensity of the storm on the 20th July overwhelmed local drainage which was not designed to cope for such extreme events, in combination with the land falling steeply from the road towards the care home.

4. The Lea and Brookfield Way

Surface water runoff caused by the gradient of the land falling towards to south-east area of The Lea resulted in the internal flooding of one property and external flooding of roads and gardens as the watercourse followed the lie of the land trying to get back into the river system, Properties impacted lie at low points as land falls toward the Kibworth Brook, this means that properties lie in the path of surface water flows as they make their way to the Kibworth Brook. No concerns relating to any highway drainage assets were raised as a result of the event however they would have been unlikely to cope with the sheer speed and volume of water from the storm. The water simply ran overland rather than being captured by drainage infrastructure.

Between Brookfield Way and The Lea, a footpath crosses Kibworth Brook (main river) on a footbridge. Downstream of the footbridge, anecdotal reports suggest that the channel is constricted by an unpermitted culvert. Water reportedly spilled out of the channel during high flows. This culvert is believed by residents to cause a throttle in the system, resulting in water backing up and overflowing during high flow/storm events. Consequently, this has contributed to internal flooding of two properties on Brookfield Way and a number of gardens on The Lea. On Brookfield Way, the road flooded also affecting a number of other properties externally.

The Council has liaised with the Environment Agency, the lead body for regulating works affecting main river, regarding the unpermitted culvert. The Environment Agency is investigating whether this, or any other unpermitted works, are contributing to increased flood risk on the main river.

Anecdotal reports from residents also suggest that water ran overland from a Network Rail embankment to gardens on Rookery Close causing garden flooding. It is thought that this was due to the sheer amount of water from the storm running to the gardens which was situated lower than the railway embankment.

5. Langton Road

Following the flood event, it was discovered that this area and property had previously been impacted by flooding (circa, 2013). Following the previous flooding the property had received flood resilience measures from Anglian Water. There had also been some additional highway drainage installed nearby the property. It is understood from resident reports that the flood resilience measures installed on the property failed to prevent water from entering the property.

It has been anecdotally reported that air brick covers, and a non-return valve fitted to the property circa 2013 were not functioning properly following lack of maintenance by Anglian Water. It is understood that a routine maintenance check schedule should have been drawn up following the installation of these measures by Anglian Water however that was never completed. It has also been reported that not all air bricks were replaced in 2013 leaving the property exposed to ingress for the event in 2021.

Through liaising with its partners, the Council is aware that Anglian Water conducted an investigation following the event on 20th July 2021 to determine how the surface water system and foul sewer network impacted the flood. The investigation determined that the network was overwhelmed by the sheer volume of surface water at Marsh Drive, Marsh Avenue and Langton Road and the system was inundated by volume of water getting into the system. Anglian Water concluded that the topography of the area impacted the flow of surface water causing water to collect at a low point on Marsh Drive. Unable to enter overwhelmed gullies, surface water found its way into the foul system and caused that system to surcharge.

Since the flooding, extensive work was undertaken by Anglian Water to improve the assets which were found to have not worked efficiently. Anglian Water has installed more air brick covers, replaced a faulty non-return valve and have agreed to install a flood door at the affected property as well as monitoring equipment in the network and flood protected inspection chamber lids on Marsh Drive. It is understood that Anglian Water carried out 6-month checks on their sewer network and its capacity prior to the coronavirus pandemic, these inspections have reportedly not recommenced since they stopped in early 2020.

The Council has also conducted further improvements to the public highway including upgrading drop kerbs and installing larger gullies along Langton Road. The Council has also carried out extensive work on Marsh Drive to remove scale and silt build up.

The affected property is located at a low point where influences such as the steepness of the highway and camber of the road, a seen in figure 3, encourage surface waters to run towards the property in question.

Water was described to come out of bank from the ditch adjacent to the property and head down the drive further contributing flood water during the event. It is not known what the source of this ditch, but it is possible that ordinary watercourse B links with it. There were no reports of any blockages of this ditch where it is culverted for access. The source of this ditch needs further investigation.

4.4 SUMMARY OF IMPACTS AND FINDINGS

On 20th July 2021 a high intensity, short duration rainfall event hit Kibworth resulting in local drainage systems becoming overwhelmed and causing internal flooding. The storm hailstones also caused extensive damage to cars and buildings and exacerbated internal flooding.

The catchment conditions in the days prior to the event were fine and dry, the ground was not baked hard and dry nor was it overly saturated. Due to the speed at which the flood event occurred, residents and businesses in Kibworth were unable to respond quickly enough to protect their properties. The thresholds for the triggers for the community response plan were also not met and so no preparation action was taken by the community.

The summary of impacts and findings relating to each flood impact area is detailed below:

1. **Kibworth Primary School**

Internal flooding from surface water was accelerated by damage to the school building roof caused by the hailstones which allowed rainfall to enter the building and various low thresholds at entry points to the school building.

2. **Church Road and Station Hollow**

The severe storm resulted in excessive surface water flooding running overland and overwhelming ordinary watercourse C. Ordinary watercourse C was also impacted from overflows from a foul sewer on Meadowbrook Road introducing further discharge into the already overwhelmed watercourse. Before ordinary watercourse C is culverted beneath Station Road/Church Road the watercourse was unable to convey the sheer volume of water and thus it backed up and overtopped its banks in the field of St Wilfrid's Close causing water to flow towards properties on Station Hollow. It is possible that there may have been defects within the culvert that exacerbated the flooding, but it is not known to what extent. The culvert would not have been designed to take such high flow volumes and given the intensity of the storm it is unlikely that any defects would have been the sole cause of the flooding.

3. **Kibworth Mead Academy and Kibworth Court Care Home**

The severe storm resulted in excessive surface water flooding running overland and into Kibworth Mead Academy as it breached low thresholds. It also overwhelmed the private drainage system of the Kibworth Court Care Home. It is not known if there were any defects in the private drainage system however, there is no firm evidence that defects would have caused the internal flooding experienced by Kibworth Court Care due to the sheer speed and volume of water caused by the storm.

4. **The Lea and Brookfield Way**

The severe storm resulted in excessive surface water flooding running overland and the public highway as it tried to make its way to the Kibworth Brook (lowest point). Highway drainage infrastructure is not designed to take flows from such storm events and quickly became overwhelmed and in cases bypassed by the fast-flowing water. Water quickly pooled in low points and breached property thresholds.

A culvert in the Kibworth Brook is thought to have restricted flow by having reduced the cross-sectional profile of the watercourse when installed. This resulted in water backing up and flowing out of channel. Given the sheer speed of the storm and volume of water, there is no evidence to suggest that the culvert was the cause of the internal flooding, but it may have contributed towards the extent of the flood water locally.

5. **Langton Road**

The severe storm resulted in excessive surface water flooding running off the highway and towards a property that is situated at a low point compared to the highway. Highway gullies were overwhelmed with the volume of water as the highway drainage infrastructure is not designed to take flows from such storm events and quickly became overwhelmed and in cases bypassed by the fast-flowing water. A ditch running adjacent to the property and highway also became overwhelmed and overtopped with waters running towards the property.

Excessive surface water also ran off the land to the north and onto the highway this then entered into the Anglian Water system causing it to surcharge at Marsh Drive.

Property flood resilience measures were installed at the affected property failed to prevent the ingress of water. It is understood that the property flood resilient measures were faulty and not maintained, this further exacerbated the severity of internal property flooding.

5. RESPONSIBILITIES

5.1 LEAD LOCAL FLOOD AUTHORITY (LCC)

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

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 BOROUGH/DISTRICT COUNCIL

The Borough/District Council has powers under Section 14 of the Land Drainage Act 1991 (LDA) to undertake flood risk management works on ordinary watercourses (excluding Main Rivers), where deemed necessary. Under Section 20 of the LDA, Harborough 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.

5.3 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.

5.4 WATER COMPANY (ANGLIAN WATER SERVICES LTD)

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 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.

5.5 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. Harrow Brook is a Main River and therefore the Environment Agency has responsibility for investigating flood risk from overtopping.

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.

5.6 RIPARIAN LANDOWNERS OF WATERCOURSES AND HOMEOWNERS

As detailed within the Environment Agency guidance ‘owning a watercourse’, riparian landowners have certain rights and responsibilities including:

- They must maintain the bed and banks of their watercourse, including 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, including gaining permissions before undertaking work in or around watercourses are given in the Environment Agency guidance, 'Owning a watercourse'.

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. RECOMMENDATIONS/ACTIONS

6.1 LEICESTERSHIRE COUNTY COUNCIL

Leicestershire County Council (LLFA) has agreed/completed the following actions:

ACTION	PROPOSED TIMESCALE
To coordinate the formal flooding investigation and feedback to the community.	Ongoing
To work with residents and other RMAs to ensure that riparian landowners are fully aware of their maintenance responsibilities for ordinary watercourses. Work to include but not limited to: • Liaise with landowner and investigate condition of ditch west of residential properties on Granary Close (flood impact area 3). • Liaise with the landowners of the culverts in flood impact areas 2 and 4. • Liaise with landowner regarding the section of open watercourse in flood impact area 2.	12 months from publication of report
To continue to work collaboratively with all partners (including RMAs) to investigate the appropriateness of a bid for national funding and investigate all other available sources of funding to help reduce flood risk to Kibworth, where resources allow. Work to include but not limited to: • Exploring opportunities for a bid to the Department for Education to mitigate flood risk to the Kibworth Mead Academy and Kibworth Primary School. • Addressing the surface water flood risk to various areas of Kibworth (including flood impact area 5). • Addressing the Main River concerns in flood impact area 4.	12 months from publication of report
To investigate connectivity into the ditch in flood impact area 5 and confirm if it links with ordinary watercourse B.	12 months from publication of report

Leicestershire County Council (Highways Authority) has agreed/completed the following actions:

ACTION	PROPOSED TIMESCALE
To continue to work collaboratively with all partners (including RMAs) to investigate the appropriateness of a bid for national funding and investigate all other available sources of funding to help reduce flood risk to Kibworth, where resources allow. Particular focus on addressing the surface water flooding which impacts flood impact area 5.	12 months from publication of report
To consider making improvements to the public highway in flood impact areas 4 and 5 including upgrading the drop kerbs and installing larger gullies along Langton Road and The Lea.	12 months from publication of report
To complete routine maintenance to the public highway infrastructure in flood impact areas 3, 4 and 5 and add them onto a P1 cyclic schedule.	Ongoing

6.2 ANGLIAN WATER SERVICES LTD

Anglian Water has agreed/undertaken the following actions:

ACTION	PROPOSED TIMESCALE
To continue to work collaboratively with all partners (including RMAs) to investigate the appropriateness of a bid for national funding and investigate all other available sources of funding to help reduce flood risk to Kibworth, where resources allow. Particular focus on addressing the surface water flooding which impacts flood impact area 5.	12 months from publication of report
To conduct an inspection into the combined sewer system to identify any defects, blockages, or intrusions in flood impact area 5 and resume six monthly checks on the capacity and function of the sewer network in close proximity.	6 months from publication of report

Review the maintenance regime for the balancing pond located in flood impact area 2 and consider any changes should the asset be of concern in future flood events.	6 months from publication of report
To consider installing further measures or replacement measures to the affected property in flood impact area 5*.	6 months from publication of report
To further liaise with homeowners in flood impact area 5 to schedule regular maintenance of property flood protection measures.	6 months from publication of report
To investigate the foul sewer discharge into ordinary watercourse C (flood impact Area 2) during storm events and consider if any improvements can be made.	12 months from publication of report
To complete a connectivity survey for Flood Impact Area 4 to assess assets in the area.	12 months from publication of report

**Reliant on delivery timescales of third-party suppliers of raw materials*

6.3 NETWORK RAIL

Network Rail has agreed/undertaken the following actions:

ACTION	PROPOSED TIMESCALE
To conduct an inspection of the culvert beneath Station Road/Church Road (flood impact area 2) to ensure it is free from blockage and maintains natural flow. Also, to review the maintenance regime of the structure to ensure that it is free from obstruction in the event of forecast of severe weather.	6 months from publication of report

6.4 ENVIRONMENT AGENCY

The Environment Agency has agreed/undertaken the following actions:

ACTION	PROPOSED TIMESCALE
To evaluate the risk from the unconsented culvert in flood impact area 4 and work with all partners (including RMAs) to continually review the flood risk and possible mitigation options in this area.	12 months from publication of report

6.5 RIPARIAN LANDOWNERS

Landowners have agreed/undertaken the following actions:

ACTION	PROPOSED TIMESCALE
The landowner of the unconsented culvert in flood impact area 4 is required to ensure that regular maintenance of the culvert is completed particularly where possible in the event of a severe weather warning.	Ongoing
To complete ongoing riparian maintenance as per their riparian responsibilities. In particular for: • the ditch west of residential properties on Granary Close (flood impact area 3). • the culverts in flood impact areas 2 and 4. • the section of open watercourse in flood impact area 2.	Ongoing
Look at the possibility of adding an additional drainage gully in the car park of South Leicestershire Medical Group to capture flows travelling towards Smeeton Road and Kibworth Mead Academy.	12 months from publication of report

STATUS OF REPORT AND DISCLAIMER

This report has been prepared as part of the Council's responsibilities under the FWMA, 2010.

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.