Flood Investigation Report

Appleby Magna

Winter 2019/2020
(14th November 2019 and 16th February 2020)

Final Report

November 2021

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

1.1 SUMMARY OF EVENT

The flood events of the 14th November 2019 and the 16th February 2020 resulted in internal damage to at least 16 residential properties in multiple locations throughout Appleby Magna. As a result of intense rainfall falling onto an already waterlogged catchment, the local drainage, highway, and public sewer networks were rapidly inundated and overwhelmed and surcharged. This caused high volumes of surface water to enter the Meadow Brook (also known locally as the 'Appleby Brook'). This volume of water quickly overwhelmed the brook's capacity and caused extensive fluvial and foul water flooding which subsequently entered residential properties.

The flooding of the 14th November triggered Leicestershire County Council's formal criteria for investigating flooding incidents, however the majority of this report focuses on the flooding resulting from Storm Dennis on the 16th February 2020. This event was more significant, but this report will cover aspects of the flooding from 14th November 2019 where relevant.

1.2 SUMMARY OF FLOOD SOURCES

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

1.3 RECEPTORS IMPACTED (NUMBER)

Residential	Business	Other Buildings	Roads	Critical Infrastructure
16	0	0	8	0

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.

A formal investigation into the flood incident in Appleby Magna on the 14th November 2019 and the 16th February 2020 has been undertaken as both events 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 Appleby Magna:

- **Leicestershire County Council** – LLFA.
- **Leicestershire County Council** – Local Highways Authority.
- **North West Leicestershire District Council** - Local Planning Authority and Land Drainage Authority who can carry out flood risk management works on minor watercourses.
- **Severn Trent Water Ltd (STW)** - Statutory undertaker for public wastewater and freshwater assets in Appleby Magna.
- **Environment Agency (EA) –** Governing body for strategic flood risk and for works on or within close proximity to the River Mease (Main River).
- **Highways England (HE) –** Governing body responsible for operating, maintaining, and improving the A42 trunk road.

3 FLOOD INVESTIGATION

3.1 LOCATION AND SETTING

The village of Appleby Magna is situated approximately 8 km southwest of Ashby de la Zouch (Figure 1) within the district of North West Leicestershire. The Meadow Brook is an ancient watercourse which runs north east through the historic village centre of Appleby Magna. Old End and Blackhorse Hill (the location of the main impacts from the flood event) are located to the north of the village.

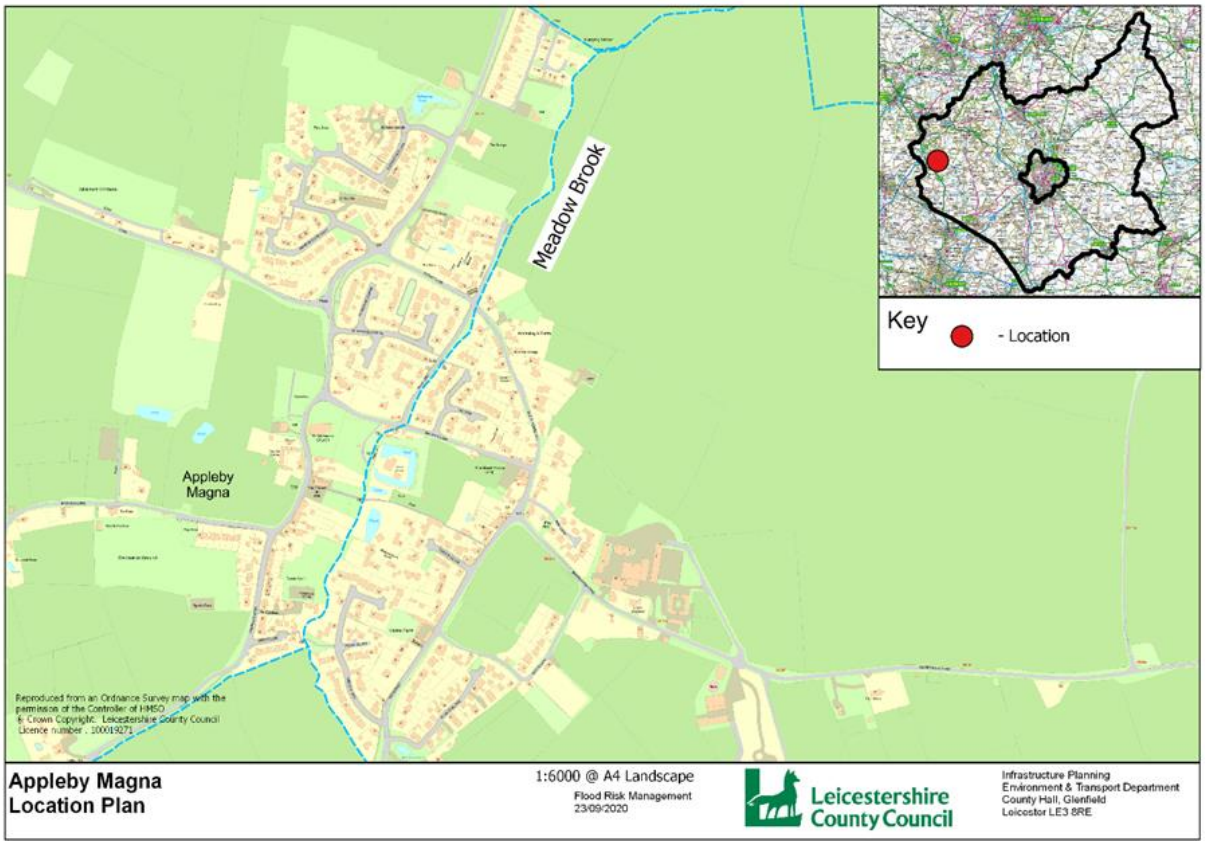


Figure 1: Location of Appleby Magna

3.2 LOCAL DRAINAGE

The Meadow Brook is a major tributary of the River Mease. It flows from the south west through the centre of the village, entering a 1.2m diameter brick arch culvert underneath Mawby's Lane (red dotted line on Figure 2 and inset Photo 1). It then runs adjacent to Duck Lake before passing under the Black Horse Hill bridge (marked on Figure 2 and inset Photo 2). The brook then continues its north easterly route adjacent to Old End before flowing away from the village. The Meadow Brook eventually discharges into the River Mease 1.5km to the north-east. The Meadow Brook is designated as an ordinary watercourse and conveys surface water from a substantial upland catchment to the south of Appleby Magna, as well as being the receiving waterbody of much of the village's surface water drainage systems.

Designated Flood Zones are located around the historic flood plain along Duck Lake and Old End. Designated Flood Zones represent the risk that this area has a chance of flooding each year. Flood Zone 2 represents a flood risk of between 1% and 3.3% each year, while Flood Zone 3 represents a flood risk of greater than 3.3% each year. The Flood Zone extents are shown on Figure 2. Please note that Flood Zones represent the potential risk of flooding directly from the watercourse and does not necessarily represent the total risk added from other sources. Although other ordinary watercourses, drainage channels and culverts may be present in the vicinity of Appleby Magna, the Council do not hold any further records.

Highway Drainage Network

The highway drainage network comprises a combination of traditional highway gullies, combined kerb drainage and linear drainage channels. The majority of these outfall into the Meadow Brook at various points. The Council as the local highway authority is responsible for the maintenance of the highway drainage system. The purpose of which is to collect and intercept rainfall that falls onto the highway and convey it to a suitable outfall.

Public Sewer Network

Appleby Magna is served by a network of combined public sewers which convey both the foul and elements of surface water out of the village northward towards a STW pumping station. The pumping station then pumps the water up a gradient in an easterly direction towards the local sewerage treatment works alongside Appleby Lane, Snarestone.

Much of the village sewerage converges at the junction of Mawbys Lane and Duck Lake into a 300mm diameter sewer which flows along Duck Lake and Old End and on towards the STW pumping station. Much of the village sewerage converges at the junction of Mawbys Lane and Duck Lake into a 300mm diameter sewer which flows along Duck Lake and Old End and on towards the STW pumping station. Further branches join this sewer from Stoney Lane and Blackhorse Hill. As the village has continued to develop over time, the pumping station and central sewer have increasingly struggled to cope during high intensity rainfall events. At such times sewage is known to flood from the first manhole up the Blackhorse Hill branch (see figure 2 ‘STW Critical Manhole’).

Wider Drainage Network

The Meadow Brook receives water from several upstream contributors. The most significant of inputs come from rainfall directly surrounding arable and pastoral farmlands, where it enters agricultural drainage systems before joining the Meadow Brook. Another major contribution comes from the surrounding road network’s drainage systems. In particular, the A42/M42 and A444 highway drainage systems contribute significant flows in peak events as a number of uncontrolled outfalls discharge directly into the catchment.

The Meadow Brook discharges into the River Mease 1.5km north east of Appleby Magna. The River Mease is a designated Special Area of Conservation (SAC) and Site

of Special Scientific Interest (SSSI) due to the high number of vulnerable fish species and European Otter populations that it supports.

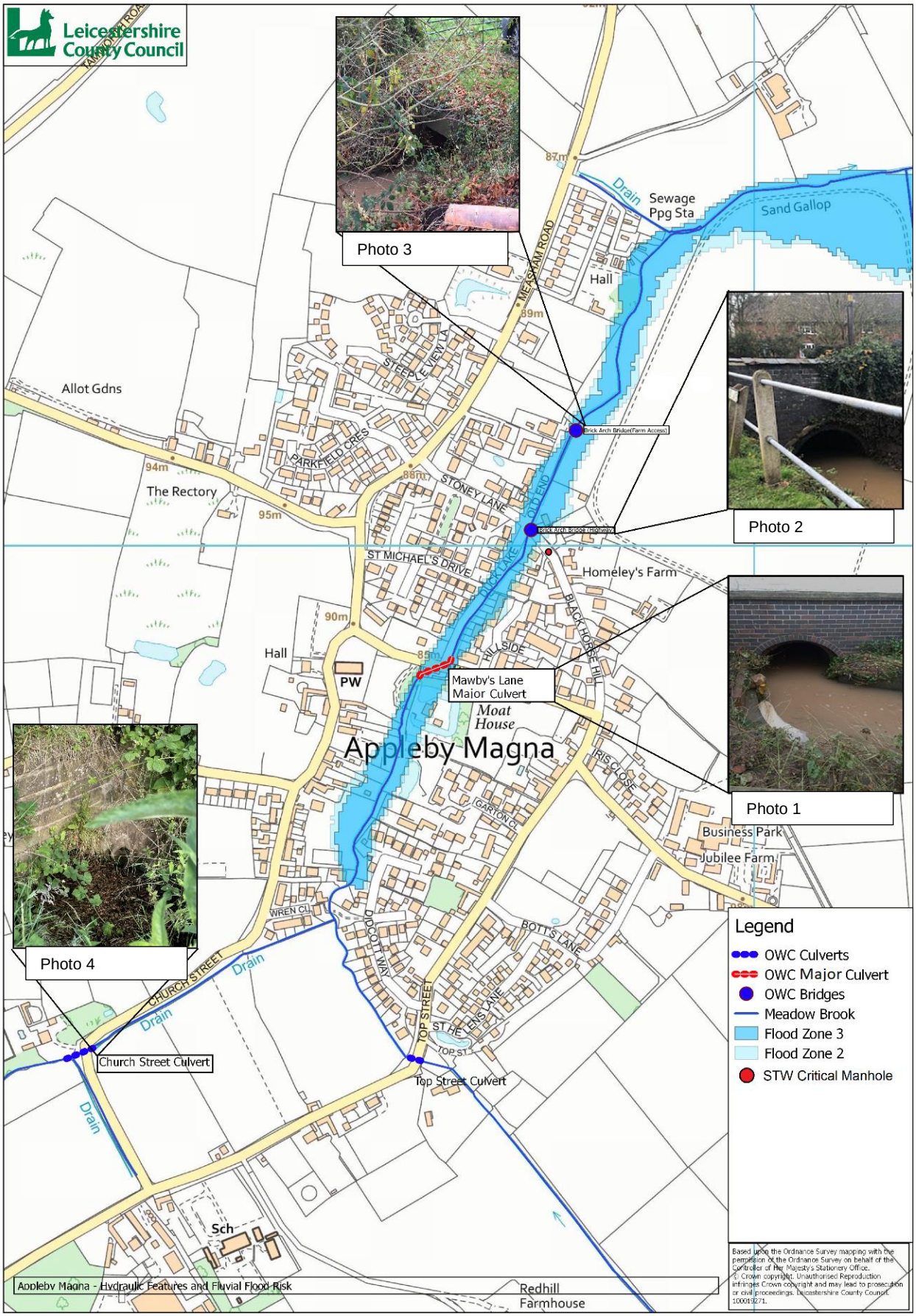


Figure 2: Location of the Meadow Brook and key features

4 FLOODING INCIDENT ON 16TH FEBRUARY 2020

4.1 PRIOR TO THE EVENT

The Council holds a suite of data relating to flooding incidents obtained from various sources prior to the events of the 14th November 2019; notably a major flooding event which occurred on 24th November 2012 (Photo 5). The incident followed similar patterns to the winter 2019/20 events, with higher than average rainfall in the summer months saturating the ground and subsequently reducing ground infiltration rates and increased surface water prevalence within the village. A formal flood investigation was not conducted for the November 2012 event as the flooding was from a known source (fluvial flooding from the Meadow Brook); reports indicate that up to four properties were flooded internally on Bowley's Lane and Blackhorse Hill.

Photo 5: The flooding to Duck Lake during the November 2012 flood event[1]

In the months prior to the event, the regional catchment had experienced extended periods of rainfall, leaving the ground saturated and unable to naturally drain through infiltration. Further prolonged rainfall fell on the farmland south west of Appleby Magna which was already saturated.

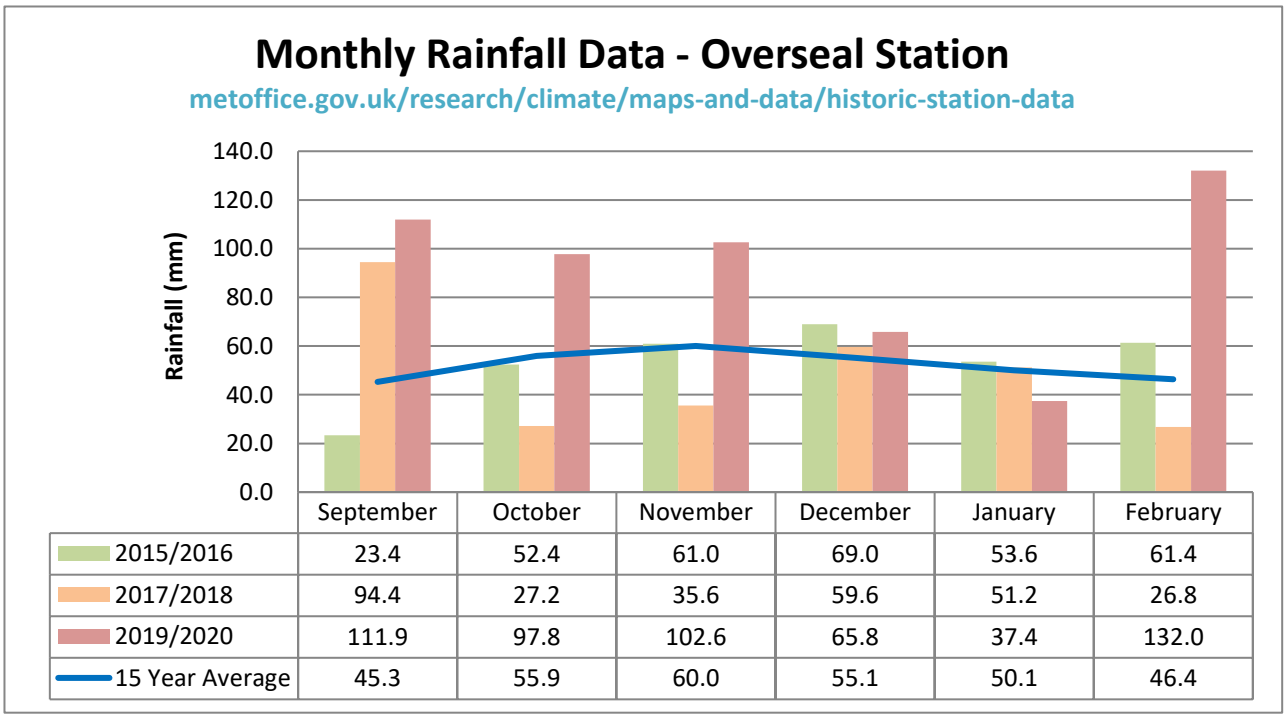
On Friday 14th February 2020, The Council received the following 'yellow' flood guidance statement from the Government's Flood Information Service.

River Mease

River levels have risen at the Packington river gauge as a result of the persistent heavy rainfall. Consequently, flooding of property, roads and farmland is expected this evening, 14/02/2020. Further rainfall is forecast this afternoon, though is expected to clear this evening. We expect river levels to rise this evening. We are closely monitoring the situation. Our incident response staff are actively checking river levels and the weather forecast. Please avoid using low lying footpaths and bridges near local watercourses and plan driving routes to avoid low lying roads near rivers, which may be flooded. This message will be updated this evening, 14/02/2020, or as the situation changes.

The day before the flooding incident (Saturday 15th February 2020) the Council and other RMAs received a Flood Guidance Statement from the Flood Forecasting Centre (FFC). The FFC is a partnership between the EA and the Met Office combining meteorology and hydrology expertise. As the FFC released a 'yellow' (Significant Impact - Low Likelihood) flood guidance statement; Leicester, Leicestershire and Rutland: Prepared (LLRP, who are the emergency response unit for the Council) were on standby. However, it was impossible to know where and at what time these flooding impacts would occur, and how severe they might be. There are no flood warden schemes in the area and no local emergency action plans existed. As such no widespread preparatory actions such as checking the status of local watercourses, gullies, culverts, obtaining sandbags and warning the public was known to have been conducted.

The Council has been provided rainfall data from the Overseal rain gauge (the closest weather station to Appleby Magna, Figure 3). Further rainfall data analysis was also provided by the Met Office with hourly rainfall data from their Sutton Bonington Weather Station Rain Gauge.



	September	October	November	December	January	February
2015/2016	23.4	52.4	61.0	69.0	53.6	61.4
2017/2018	94.4	27.2	35.6	59.6	51.2	26.8
2019/2020	111.9	97.8	102.6	65.8	37.4	132.0
15 Year Average	45.3	55.9	60.0	55.1	50.1	46.4

Figure 3: Annual rainfall data – comparative rainfall data for the relevant winter period with previous 2 winters and the 15-year average for comparisons

Well above average rainfall was experienced across the East Midlands throughout the Autumn and Winter of 2019/2020. During this time period, only during the month of January was the rainfall level below the 15-year average. Comparing this rainfall data to the previous large-scale flooding events in Appleby Magna (November 2012 and November 2019) when 94mm and 102.6mm of rain were recorded respectively; February 2020 recorded 132mm of rainfall.

When the daily rainfall data is analysed, both the 14th November 2019 and 16th February 2020 flooding events occurred following a short period of intense rainfall. On the 14th November, 39mm of rainfall was recorded over the previous 24 hours, deemed to be equivalent to a 1 in 5-year storm event, or having a 20% chance of occurring each year. This is considered a significant rainfall event, expected to increase the volume of water flowing through the Meadow Brook at the point it joins the River Mease by around 42%.

On the 16th February, 54mm of rainfall was recorded over the previous 24 hours, with 42mm falling within an 8-hour period prior to the maximum flooding at around 5am. This was deemed to be roughly equivalent to a 1 in 19-year storm event, or a 5.3% chance of occurring each year. This is considered a severe rainfall event, expected to increase the volume of water flowing through the Meadow Brook at the point it joins the River Mease by around 210%.

4.2 FLOOD EVENT – 16TH FEBRUARY 2020

The main impacts of the intense rainfall occurred in the early hours of the morning on the 16th February 2020. According to resident reports at least 16 homes suffered water ingress, with approximately a further twenty-five suffering some external flooding to gardens and outbuildings. In addition to this, significant highway flooding was reported on Stoney Lane, Duck Lake, Blackhorse Hill, Mawby's Lane, Church Street, Bowley's Lane and Rectory Lane and Old End (private road), rendering all roads unpassable to most vehicles.

Resident and witness accounts on the day of the incident indicate that surface water was flowing from the farmland and highways south west of Appleby Magna and into the two upper tributaries of the Meadow Brook. Significant surface water from the A444, Bowley's Lane and New Road discharged into the field ditches which feed the Meadow Brook near Church Street. Having reached the Meadow Brook, the water rapidly flowed north towards the village centre. Once the flood water reached the village centre, along Duck Lake, the rate of flow decreased due to land height levelling off. This water overwhelmed the brook and overtopped into the adjacent green space and the road as is expected during high intensity events (Photo 6).

Photo 6: Black Horse Hill looking towards the Meadow Brook just visible at the top of the photo.

Photo 7: Looking across Duck Lake towards the Meadow Brook.

As previously noted, the anecdotal flood reports received following the flooding event of the 14th November showed a very similar pattern to the flooding. However, as discussed previously, the return period for this event was less than the February event, resulting in a much lower volume of surface water runoff.

The following areas of Appleby were affected by the flooding:

a. Duck Lake (6 External Properties)

Duck Lake runs adjacent to the Meadow Brook and as such was flooded by fluvial flows from the brook along its length (section 'd' in Figure 4). The flood extent roughly matched the EA Flood Zone 2 maps (Figure 2) and the EA Risk of Flooding from Surface Water map (Figure 4). No internal property flooding is known to have occurred although several residential properties suffered external flooding and the highway drainage system was damaged.

b. Blackhorse Hill (4 Internal Properties, 3 External Properties)

The north-west end of Blackhorse Hill suffered severe flooding up to depths of around 1.2m, with surface water from the overloaded public sewer system combining with fluvial flooding from the Meadow Brook (section 'd' in Figure 4). Four residential properties suffered severe internal property flooding and foul contamination from the surcharged combined sewer. In addition to the surface water runoff, residents also witnessed the surcharging of the STW combined system on Black Horse Hill, where an inspection chamber (marked on Figure 2) lifted and caused significant foul contamination to properties and public spaces on Blackhorse Hill and Old End.

c. Mawby's Lane (2 Internal Properties, 1 External Property)

Mawby's Lane suffered extensive fluvial flooding from the Meadow Brook, with surface water from the highway contributing (section 'd' in Figure 4). Although a major culvert

runs underneath Mawby's Lane, the culvert was described to be free flowing and unobstructed and only surcharged due to the volume of backed-up flood water from downstream. Two residential properties suffered internal flooding, with several others only protected through the use of sandbags.

d. Old End (3 Internal Properties, 5 External Properties)

Old End suffered fluvial flooding when flood water backed up the road from Duck Lake (section 'd' in Figure 4). Three residential properties suffered internal flooding, with others also suffering flooding to gardens and outbuildings due to surface water runoff from the housing development behind Measham Road. Old End also suffered foul water contamination from the overloaded combined sewer. The Meadow Brook section beyond Old End was heavily restricted and blocked with debris. This reduction in flow velocities caused significantly more water to back up through the village, inundating Duck Lake and the low point of Mawby's Lane (Photo 8).

e. Church Street (5 Internal Properties, 4 External Properties)

The flooding to Church Street was caused by surface water runoff from the surrounding fields (section 'a' in Figure 4). Highway drainage systems also became overwhelmed (being not designed to take run-off) and residential properties suffered internal flooding due to water pooling in the highway before breaching thresholds. In total, 5 properties were confirmed to have suffered internal property flooding. With confirmed reports of a further 9 suffering some form of external property flooding to gardens and garages.

f. Bowleys Lane (2 Internal Properties, 2 External Properties)

The flooding to Bowley's Lane was caused by surface water runoff from the surrounding fields (section 'a' in Figure 4). Highway drainage systems also became overwhelmed and the road was impassable. Garden flooding was reported to several residential properties with two suffering internal flooding.

g. Rectory Lane (3 External Properties)

Residents reported flooding along Rectory Lane resulting from surface water runoff from the surrounding fields and allotments which overwhelmed ditches and highway drainage system (section 'e' in Figure 4). The road was described to be inundated and impassable. Residential properties suffered external flooding and two residential properties deployed ad-hoc barriers to prevent water ingress into their properties. This surface water added to the flows already running down Mawby's Lane and Black Horse Hill towards the Meadow Brook.

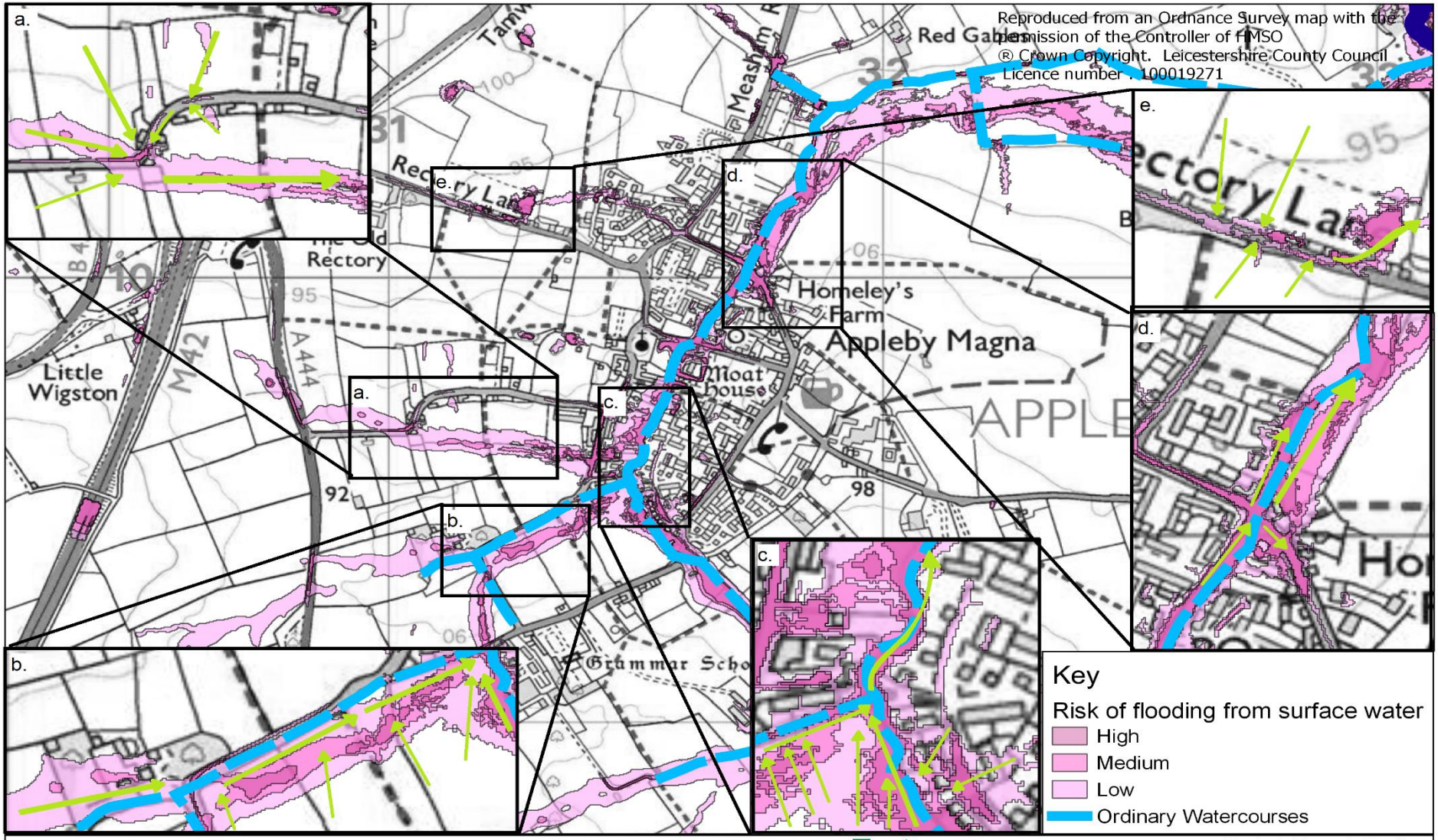


Figure 4.
Risk of flooding from surface water 1:1000 @ A4 Landscape

Leicestershire County Council

Strategic Property Services
Corporate Resources Department
County Hall, Glenfield
Leicester LE3 8RE

Figure 4 Areas affected by the flooding (arrows indicate the known and reported flow paths).

4.3 POST FLOOD EVENT

Following the 14th November 2019 event, the Council met with relevant RMAs and residents to gather information and coordinate actions. This included:

- A public meeting with affected residents on the 21st November 2019. Also attended by NWLDC.
- A parish council meeting on the 5th December 2019 also attended by NWLDC, LLR Prepared and affected residents.
- A follow up public meeting with affected residents on the 7th February 2020. Also attended by STW.

Following the more significant Storm Dennis event on the 16th February 2020. The Council arranged a flood recovery surgery to coordinate the response to this event, and to gather new information. This was attended by NWLDC, STW, affected residents and the newly established Appleby Magna Flood Resilience Group.

Immediately following the 14th November 2019 event, the Council, STW and NWLDC activated recovery elements to assist the affected residents in addition to attending various meetings/site visits. In the weeks following the flood event, the following actions were undertaken:

- NWLDC with assistance from the Council undertook clearance of the section of the Meadow Brook adjacent to Old End. This included the removal of silt, vegetation, fallen trees and the reprofiling of the channel to restore the natural flow of the brook (see Photos 8 and 9).
- On the 19th November 2019, the UK National Government activated the 'Flood Recovery Scheme', providing multiple grant schemes to help residents recover from flooding and protect their properties. This scheme was later extended to cover the Storm Ciara and Dennis flooding. On 27th February 2020, NWLDC residents became eligible for the scheme and have been processing applications for Property Flood Resilience (PFR) with the assistance of the Council.
- The Council, as the Local Highways Authority, conducted multiple reactive inspections and clearing of the local drainage network which took many months.
- STW initiated an investigation into its combined sewer system in order to ascertain operational effectiveness. A more comprehensive study launched following the flooding on 16th February 2020.
- Following reports of regular foul water and detritus contamination in the Meadow Brook, surrounding streets and properties, the EA investigated these reports and issued recommendations and actions to STW.

Photo 8: the condition of Meadow Brook alongside Old End prior to the NWLDC remedial work

Photo 9: the condition of Meadow Brook alongside Old End upon completion of NWLDC remedial work.

Relevant Historic Information

Appleby Magna grew around the Meadow Brook during the early to mid-Saxon era. The village sits in a shallow valley which has been historically associated with fluvial flooding. The natural flood plain (where the valley bottom is at its widest and flattest) is known as Duck Lake. Most of the historic buildings such as St Michaels, All Angels church and the late Medieval moat house were deliberately built upstream of this natural flood plain where the valley is narrower and steeper, and thus better protected against flooding. In modern times the village has expanded northwards along the Meadow Brook onto the historic flood plain.

The Meadow Brook's natural path appears to have been altered throughout history (Figure 5). Most likely this occurred circa 1750, where the downstream section of the brook was channelized and straightened to remove natural meanders and reduce flooding to surrounding fields. This can have a significant effect on flood risk as it encourages a higher volume of water to move quickly downstream. In the case of the watercourses upstream of Appleby Magna, this channelisation allows water to move quickly, increasing the volume of water converging in the Meadow Brook adjacent to Duck Lake.

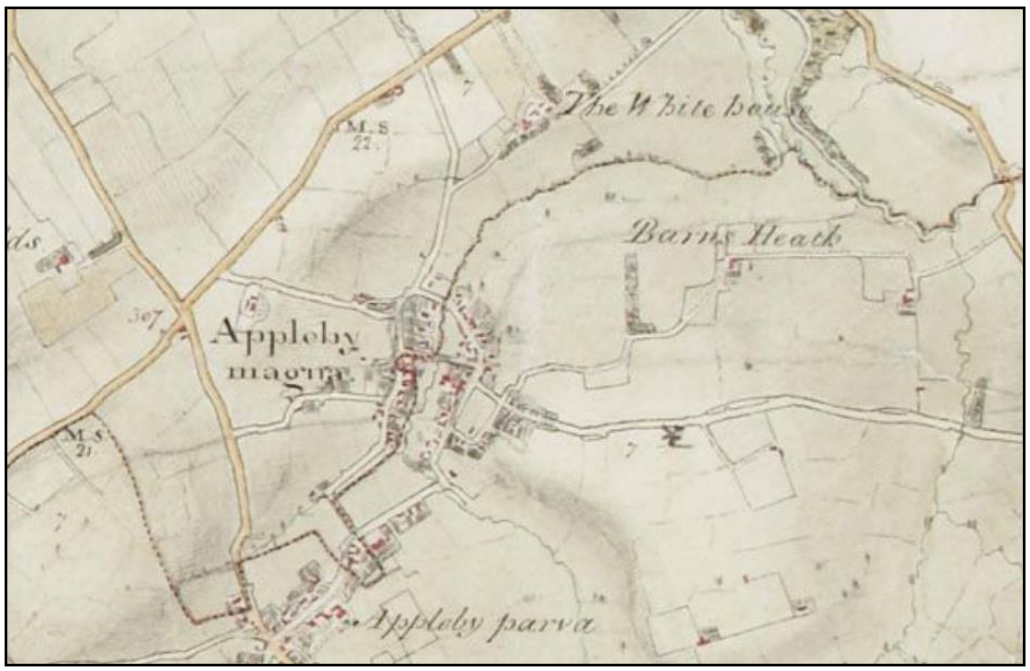


Figure 5: Historic map of Appleby Magna (1805), the original course of the Meadow Brook appears to be faintly visible below the County boundary line.

4.4 SUMMARY OF IMPACTS AND FINDINGS

The result of the combination of factors described below resulted in the ingress of storm flood water to 16 residential properties and the external flooding of at least 25 additional residential properties on the 16th February 2020:

- Higher than average rainfall over the previous months had saturated the surrounding farmland and greatly reduced the catchment lag time through infiltration.
- During both events, the intense rainfall overwhelmed the already saturated ground. The water could not infiltrate and overwhelmed the local drainage network and flowed across land.
- Much of the surface water flowed onto the local road network where it quickly overwhelmed the local highway drainage systems. This caused water to pool in low points and rendered the roads impassable. This pooling led directly to the flooding of properties on Bowley's Lane and Church Street.
- The multiple overland flow routes which could not enter the highway drainage system converged on the Meadow Brook via Mawby's Lane and Blackhorse Hill. This led to the brook bursting its banks across Duck Lake in the expected manner as per the EA flood maps.
- The volume of water entering the Meadow Brook, combined with a large amount of natural woody debris created restrictions on the downstream end of the historic flood plain (adjacent to Old End).This reduced the ability of the Meadow Brook to convey water away quickly and created an additional build-up of water.

There are many factors that may have exacerbated the impacts of the flood event. Whilst these factors may have made a difference to the volume and peak flood levels, at the time of writing this report, there is no firm evidence that these factors would have prevented any of the internal flooding experienced by this event. These include:

- The lack of a local Flood Warden, no available EA flood alert scheme and emergency plan meant that residents were unable to organise effective measures to protect their properties. Such measures include moving vehicles or protecting their properties with sandbags and silica gel bags etc.
- The Mawby's Lane culvert is designed with a dog leg turn which may impact hydraulic performance and slow down the flow of water. The culvert is sufficiently sized and well maintained and is unlikely to have made any significant impact on the flooding.
- The riparian owned roadside ditches along several of the village's roads were found to have been overgrown and a reduced capacity to convey flow during the event. Given the sheer volume of water experienced during the flood event the impact of this is however considered to be negligible.
- In several locations around Appleby Magna, the highway drainage gullies and drains were found to have been ineffective at intercepting the volume of surface water entering the highway from surrounding fields. While internal property flooding on Church Street and Bowley's Lane, in other locations (Duck Lake, Mawby's Lane and Blackhorse Hill) the effect of the drainage was insignificant, as the highway systems outfalls were already overwhelmed by the Meadow Brook itself. It should however be noted that it is not the purpose of the highway drainage network to intercept additional flows from sources other than what falls on the highway itself.

5 RESPONSIBILITIES

5.1 LEAD LOCAL FLOOD AUTHORITY (LCC)

As the LLFA, the Council has the responsibility to co-ordinate the management of 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

North West Leicestershire 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 North West Leicestershire District Council has the powers (by agreement of any person and at their expense) to undertake drainage work which that person is entitled to carry out and maintain.

5.3 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 power to prevent water running onto the highway from adjoining land.

5.4 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.

5.5 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, 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 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.

5.6 HIGHWAY AUTHORITY (HIGHWAYS ENGLAND)

As Highways England have the role of highway authority for motorways and major (trunk) roads, they have a duty to maintain the Highway under Section 41 of the Highways Act (1980). Section 100 states that LCC also has the 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).

5.7 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.

6 RECOMMENDATIONS/ACTIONS

6.1 LEICESTERSHIRE COUNTY COUNCIL (AS THE LEAD LOCAL FLOOD AUTHORITY)

Leicestershire County Council has agreed/completed the following actions:

ACTION	PROPOSED TIMESCALE
Coordinate actions of the RMA's and feedback to the community and other stakeholders where appropriate.	Ongoing
To continue to work in partnership with other RMA's to establish potential multi-agency flood and pollution mitigation projects along the Meadow Brook catchment. This should include continuing to explore future potential flood alleviation schemes in Appleby Magna, including (but not limited to): o Natural Flood Management projects. o Property Level Resilience; and, o Watercourse flow gauges and telemetry systems.	Ongoing
Worked with residents and other RMAs to ensure that riparian landowners are fully aware of their maintenance responsibilities for the brook and has issued Guidance Notes to assist with this as well as attended site visits. The Council has investigated the role of downstream and upstream blockages on the Meadow Brook during flooding events. Large obstructions were identified, and landowners were both identified and given instruction to clear these issues via letters.	Completed
Consider adding any key flood risk structures to the Council's Flood Risk Asset Register where appropriate.	6 months from publication date
Support NWLDC where possible in ensuring the national Property Flood Resilience Recovery Support Scheme is rolled out to as many eligible properties as possible.	6 months from publication date

6.2 LEICESTERSHIRE COUNTY COUNCIL (AS THE LOCAL HIGHWAYS AUTHORITY)

Leicestershire County Council has agreed/completed the following actions:

ACTION	PROPOSED TIMESCALE
To inspect all highways drainage assets in the Appleby Magna area and undertake all required remedial work.	Completed May 2021 and ongoing in line with LCC maintenance schedule.
To continue to assess the suitability of highways drainage assets and to undertake any required improvements to facilitate the long-term effective drainage of the highway.	12 months from publication date

6.3 SEVERN TRENT WATER

Severn Trent Water has agreed/completed the following actions:

ACTION	PROPOSED TIMESCALE
To continue to investigate their foul/combined drainage systems, including assessment of the suitability of the pumping station adjacent to the Meadow Brook off Measham Road, and identify remedial work where required working in partnership with all other RMAs.	12 months from publication date
To continue to assess the suitability of the River Mease pumping station and undertake any required improvements.	24 months from publication date

6.4 NORTH WEST LEICESTERSHIRE DISTRICT COUNCIL

North West Leicestershire District Council has agreed/completed the following actions:

ACTION	PROPOSED TIMESCALE
To continue to engage with the local Parish Council and residents to establish a formal Flood Resilience Group and support volunteer flood wardens.	6 months from publication date
To investigate (as the Local Planning Authority) the housing developments on Measham Road and Top Street to assess the suitability of the developments in relation to mitigating flood risk. Consider future impacts and work collaborative with LCC as	Completed and ongoing

LLFA in reviewing future applications in relation to surface water drainage strategies in this community.	
To undertake regular inspection and maintenance of any NWLDC owned sections of the Meadow Brook and other ordinary watercourses. This includes sections they have either formally or informally agreed to continue to maintain.	6 months from publication date

6.5 THE ENVIRONMENT AGENCY

The Environment Agency has agreed/completed the following actions:

ACTION	PROPOSED TIMESCALE
To continue to work in partnership with other RMA's to establish potential multi-agency flood and pollution mitigation projects along the Meadow Brook catchment.	6 months from publication date
To investigate the confluence between the River Mease and the Meadow Brook and identify possible projects which could increase downstream capacity during major flooding events.	12 months from publication date
Investigate the impact of the STW capacity issues on downstream water quality. In particular the impact on the River Mease SAC. Consider recommending further remedial action to STW where appropriate.	6 months from publication date
Consider adding Appleby Magna and the Meadow Brook to its flood alert system to ensure residents are adequately warned.	3 months from publication date.

6.6 HIGHWAYS ENGLAND

Highways England has agreed/completed the following actions:

ACTION	PROPOSED TIMESCALE
To work in partnership with other RMA's to establish potential multi-agency flood and pollution mitigation projects along the Meadow Brook catchment.	6 months from publication date
To inspect and investigate the A42 drainage assets to assess their contribution to downstream flooding and to propose suitable measures to restrict outfall rates where appropriate working in partnership with all other RMAs.	12 months from publication date

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.

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