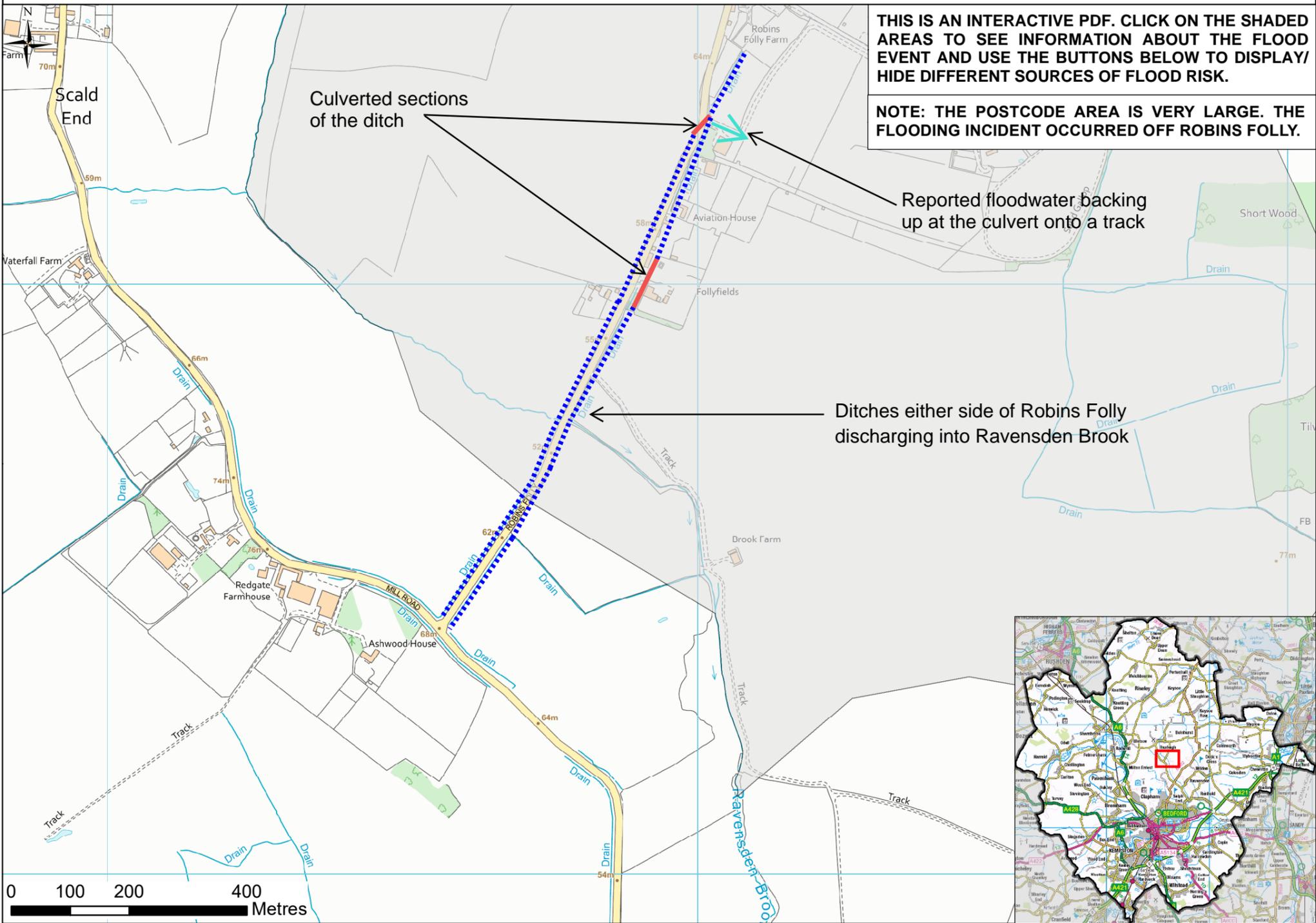


The Robins Folly area in the parish of Thurleigh suffered flooding in December 2020. Under the Flood and Water Management Act 2010, Bedford Borough Council as the Lead Local Flood Authority (LLFA) has the duty to investigate the flood event. The scope of this flood investigation is to identify the source, cause and impact of flooding from available information; identify actions completed by relevant Risk Management Authorities (RMAs) in response to the flood event; and consider actions to better understand and manage the risk of flooding in the affected area.



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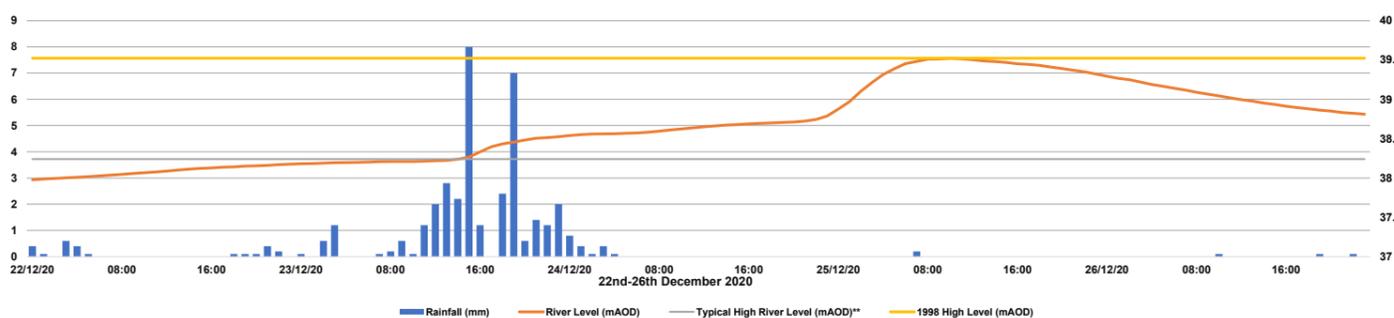
Legend

- | | | |
|---------------------------------------|-------------------------------|--|
| Postcode Boundary | Flood Map for Planning | Risk of Flooding from Surface Water |
| EA Flood Warning Areas | Flood Zone 3 | High risk of flooding (3.3% AEP) |
| Flood Warning Areas | Flood Zone 2 | Medium risk of flooding (1% AEP) |
| Areas benefitting from flood defences | | Low risk of flooding (0.1% AEP) |

CLICK ON THESE BUTTONS

- | | |
|--|--|
| | |
| | |

Rainfall and River Data *



*Rainfall and River data was obtained from the Environment Agency (May 2021)
 **River levels below this level 90% of the time.

Rainfall and River Gauges

| | |
|---------------------|------------|
| Nearest Rain Gauge | Thurleigh |
| Distance to Gauge | 2.57 km |
| Nearest River Gauge | Sharnbrook |
| Distance to Gauge | 5.2 km |

Rainfall and River Data Interpretation

The graph identifies that the main rainfall event at the nearest rainfall gauge to Thurleigh occurred between 08:00 on December 23rd and 04:00 on December 24th. The total rainfall volume is recorded as 34.7mm with a peak rainfall intensity of 8mm/hour. This single event saw more than half of the 55mm of rainfall which is expected for the whole month of December on average.

There is a ditch which runs alongside Robins Folly and discharges into the Ravensden Brook further downstream. The Ravensden Brook discharges into the River Great Ouse approximately 7km to the south of Robins Folly at Bedford. The nearest gauge in the River Great Ouse to Thurleigh is located at Sharnbrook. Although Sharnbrook is significantly upstream of where the Thurleigh river system meets the River Great Ouse, the river levels at Sharnbrook are shown on the graph to provide context.

The graph shows that the river levels were elevated above the 'typical high river level' from 15:00 on December 23rd and stayed above this level until beyond December 26th. The 'typical high river level' at the Sharnbrook gauge station is identified as 38.2m Above Ordnance Datum (AOD). River levels above this are only expected to be recorded 5% of the time. The 1998 peak flood level is included, which was recorded as 39.5m AOD, and the graph shows that the December 2020 river levels reached the 1998 level at 7:00 on December 25th.

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SOURCE OF FLOODING: Surface Water

FLOOD EVENT & CAUSE

One residential property reported internal flooding on December 23rd, with flood depths up to approximately 250mm across the ground floor.

There is a drainage ditch which runs alongside both sides of Robins Folly road from north to south. The ditch is culverted beneath the road to the north of the affected property (see map annotation) before continuing on both sides of the road. The eastern ditch is culverted again beneath properties (see map annotation). The ditches then discharge into Ravensden Brook further south. The ditches convey surface water runoff from a catchment area of approximately 100ha¹. It was reported that floodwater was flowing towards the affected property from the north along the road, and that water was backing up at the first culvert onto the adjacent track (see map annotation). The Fire Service attended on December 23rd to pump water from the eastern ditch to the western ditch to try to divert floodwater away from the affected property. It was reported that the western ditch had spare capacity whilst the eastern ditch was overtopping and backing up at both culvert constriction points.

The Environment Agency Flood Risk from Surface Water mapping² identifies flooding along the ditch, the road, and adjacent properties. The affected property is located immediately adjacent to an area identified as at 'high' risk of surface water flooding, which means that the chance of flooding is greater than 3.3% in any given year.

December 2020 was a very wet month with an average rainfall of 108mm across East Anglia, which is 95% higher than the December average³. The three months leading up to December also saw higher than average rainfall such that by December 23rd the ground was already saturated. This, combined with the rainfall recorded during the dates in question, meant that surface water was less able to infiltrate into the ground and more likely to form overland flood flow routes and run off into the Robins Folly ditches. In conclusion, it is thought that heavy rainfall and saturated ground conditions contributed to the ditch exceeding its capacity, in particular at the points where it is constricted by culvert capacity. Any maintenance issues with the ditches would have exacerbated the flooding experienced. In addition, the high levels in the River Great Ouse could have prevented the Ravensden Brook from discharging freely, potentially raising water levels upstream and exacerbating the flooding experienced.

FLOOD WARNINGS & IMMEDIATE RESPONSE

- **23/12/2020:** Lead Local Flood Authority (LLFA) monitored/assessed locations based on conditions and forecast predicted.
- **23/12/2020 12:56, 14:35:** Fire service diverted water across roadway using a major pump and provided flooding advice to resident.
- **24/12/2020 daytime:** LLFA officers visited those which flooded on December 23rd to gain information on the damage caused and offer assistance.
- **25/12/2020 14:30:** Flooding experienced in the wider area declared a major incident by Bedford Borough Council.
- **28/12/2020:** LLFA, Bedford Flood Response Team, and volunteers from the Council visited properties to carry out impact assessment to help with recovery and clean up.

ACTIONS

| Timescale | Action | Responsible Party |
|---------------------------|--|---|
| Complete | Investigate the ditch on both sides of Robins Folly road and undertake maintenance to maximise the capacity. This has already been completed by a resident. | Riparian Owner |
| Ongoing | Investigate the capacity of the existing culvert structures beneath Robins Folly road to identify the possibility for improvement works to the local drainage. A Capital Scheme is underway to look at the potential benefits of an additional pipe beneath the road next to the existing culvert and/or constructing a pipe from north to south following the alignment of the road to provide additional capacity. | Lead Local Flood Authority / Bedford Highways |
| Medium term (6-12 months) | Undertake a capacity assessment of the Robins Folly ditches to understand the potential benefits of upsizing. | Lead Local Flood Authority |
| Medium term (6-12 months) | Liaise with landowners to ensure the Robins Folly ditches are maintained along the entire length of the road including land drainage in the fields located in the upstream catchment areas to the north, setting a suitable inspection and maintenance regime as necessary. | Lead Local Flood Authority |

ORIGINATED: Nora Balboni CEng C.WEM MCIWEM, Senior Engineer, 21/07/2021

CHECKED/VERIFIED: Matt Tandy C.WEM MCIWEM MInstLM, Principal Engineer, 23/07/2021



¹ Flood Estimation Handbook (FEH) web service, <https://fehweb.ceh.ac.uk/> [accessed June 2021].

² Environment Agency Flood Risk from Surface Water map, <https://flood-warning-information.service.gov.uk/>, [accessed June 2021].

³ Environment Agency, December 2020 Flooding Great Ouse Catchment Summary.