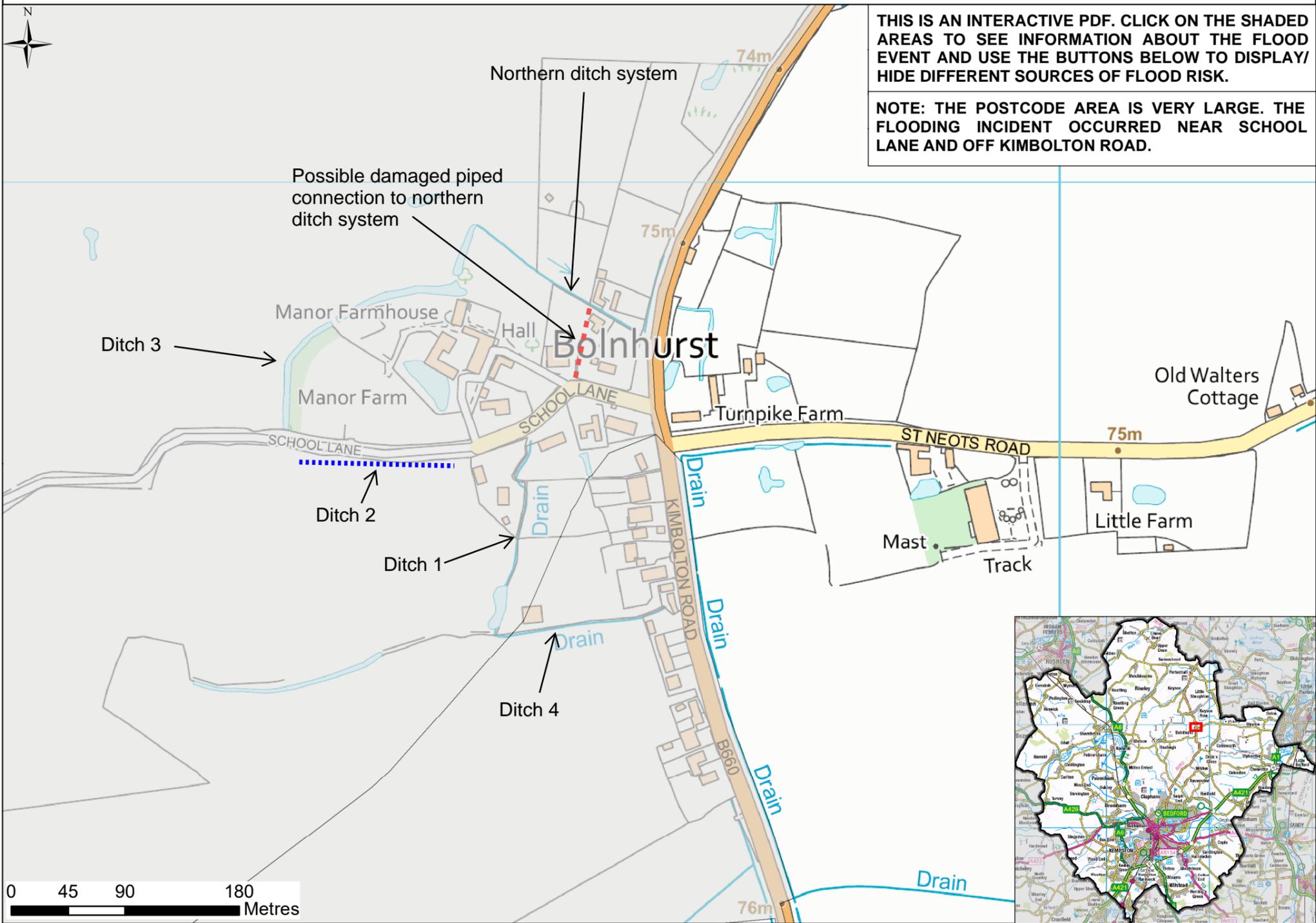


The village of Bolnhurst suffered flooding in December 2020. Under the Flood and Water Management Act 2010, Bedford Borough Council as the Lead Local Flood Authority (LLFA) has the duty to investigate the flood event. The scope of this flood investigation is to identify the source, cause and impact of 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
- EA Flood Warning Areas
- Flood Warning Areas
- Areas benefitting from flood defences

Flood Map for Planning

- Flood Zone 3
- Flood Zone 2

Risk of Flooding from Surface Water

- High risk of flooding (3.3% AEP)
- Medium risk of flooding (1% AEP)
- Low risk of flooding (0.1% AEP)

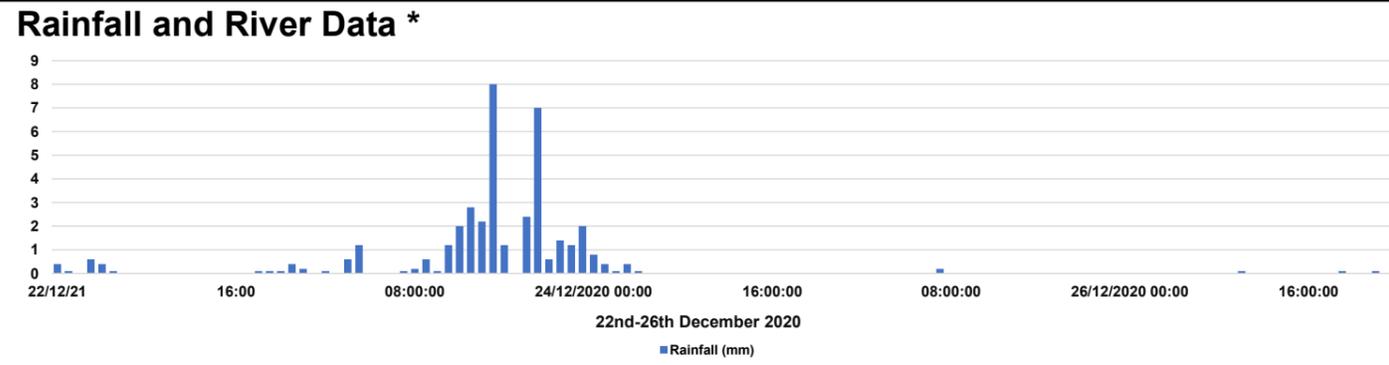
CLICK ON THESE BUTTONS

FLOOD MAP FOR PLANNING

RISK OF FLOODING FROM SURFACE WATER

FLOOD WARNING AREAS

BACKGROUND MAP



Rainfall and River Gauges

Nearest Rain Gauge	Thurleigh
Distance to Gauge	3.64 km
Nearest River Gauge	N/A
Distance to Gauge	N/A

*Rainfall data was obtained from the Environment Agency (May 2021)

Rainfall and River Data Interpretation

The graph identifies that the main rainfall event at the nearest rainfall gauge to Bolnhurst 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 are no Main Rivers or significant watercourses in the vicinity of Bolnhurst. The flood mechanism in Bolnhurst is therefore not expected to be related to river levels.

SOURCE OF FLOODING: Surface Water

FLOOD EVENT & CAUSE

A community building off School Lane experienced internal flooding following the heavy rainfall in the area between December 23rd and the early hours of December 24th, causing extensive damage throughout. School Lane was reported to be impassable due to the floodwater. The reported flood mechanism is consistent with the Environment Agency Flood Risk from Surface Water Mapping¹, which shows that water is predicted to flow toward School Lane from two ditches (ditch 1 and 2 on the map). The heavy rainfall resulted in overland flows across the fields and is thought to have overwhelmed the capacity of the ditches, overtopping onto School Lane and the community building.

Ditch 2 (see map annotation) is understood to fall from west to east. However, it is understood there is pipe beneath School Lane which connects ditch 2 to ditch 3 to the north and could provide an alternative outfall. In addition, it is thought likely that the flooding at the community building was exacerbated due to a piped connection between School Lane and the ditch system to the north (see map annotation) having been damaged, causing water to back up.

A second property (residential) approximately 200m further south off Kimbolton Road flooded internally at 1am on December 24th to approximately 100mm depth throughout the ground floor, and more extensive depths in the garage. It was reported that the flooding occurred from flood water overtopping ditch 4 (see map annotation), which is reported to have been in need of maintenance. The reported flood mechanism is consistent with the Environment Agency Flood Risk from Surface Water mapping, which shows a flow route from the ditch causing water to pond at the property. It is not clear if this ditch has a formal outfall or infiltrates to ground.

December 2020 was a very wet month with an average rainfall of 108mm across East Anglia, which is 95% higher than the December average². 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 run off into ditches and form overland flood flow routes. The general direction of surface water flow in Bolnhurst is thought to be northwards, via roadside ditches to join the Duloe Brook. There are, however, a number of ditches surrounding the village appear to be isolated with no obvious discharge location. In conclusion, it is thought that the flooding in Bolnhurst occurred due to a combination of saturated ground, high rainfall, and blocked ditches/drainage.

FLOOD WARNINGS & INITIAL RESPONSE

- **23/12/2020:** Lead Local Flood Authority (LLFA) officers monitored/assessed locations based on the conditions and forecast predicted.
- **24/12/2020 02:32 and 08:38:** Fire service provided flooding advice to residents in the area.
- **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 highway drainage in the area and clear any blockages. A blocked gully on School Lane opposite the old School House was cleared in February 2021.	Bedford Highways
Short term (action started)	Liaise with the landowner to regrade the ditch immediately south of School Lane (ditch 2 on map annotation) and investigate the pipe connection to the north ditch system. Liaise with landowners of ditch 3 to understand that the ditch is running at full capacity and free from blockages.	Lead Local Flood Authority / Riparian Owner
Short term (action started)	Investigate the potential to divert the surface water flow route from School Lane into a soakaway. The soil characteristics are currently being assessed.	Bedford Highways
Short term (1-6 months)	Liaise with the landowner to ensure the ditch leading to Kimbolton Road (ditch 4 on map annotation) is maintained, agreeing a suitable inspection and maintenance regime as necessary. Investigate the discharge of this ditch and consider improvements as appropriate.	Lead Local Flood Authority / Riparian Owner
Medium term (6-12 months)	Investigate the condition and levels of the potential damaged pipe connection between School Lane and the ditch system to the north to understand if there would be any benefit in re-instating it.	Bedford Highways / Landowner
Medium term (6-12 months)	Investigate the benefit of resizing the ditch to the south of School Lane to maximise the amount of water held upstream. Liaise with landowners to discuss findings and agree next steps.	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 Environment Agency Flood Risk from Surface Water mapping, <https://flood-warning-information.service.gov.uk/long-term-flood-risk> [accessed June 2021].

² Environment Agency, December 2020 Flooding Great Ouse Catchment Summary