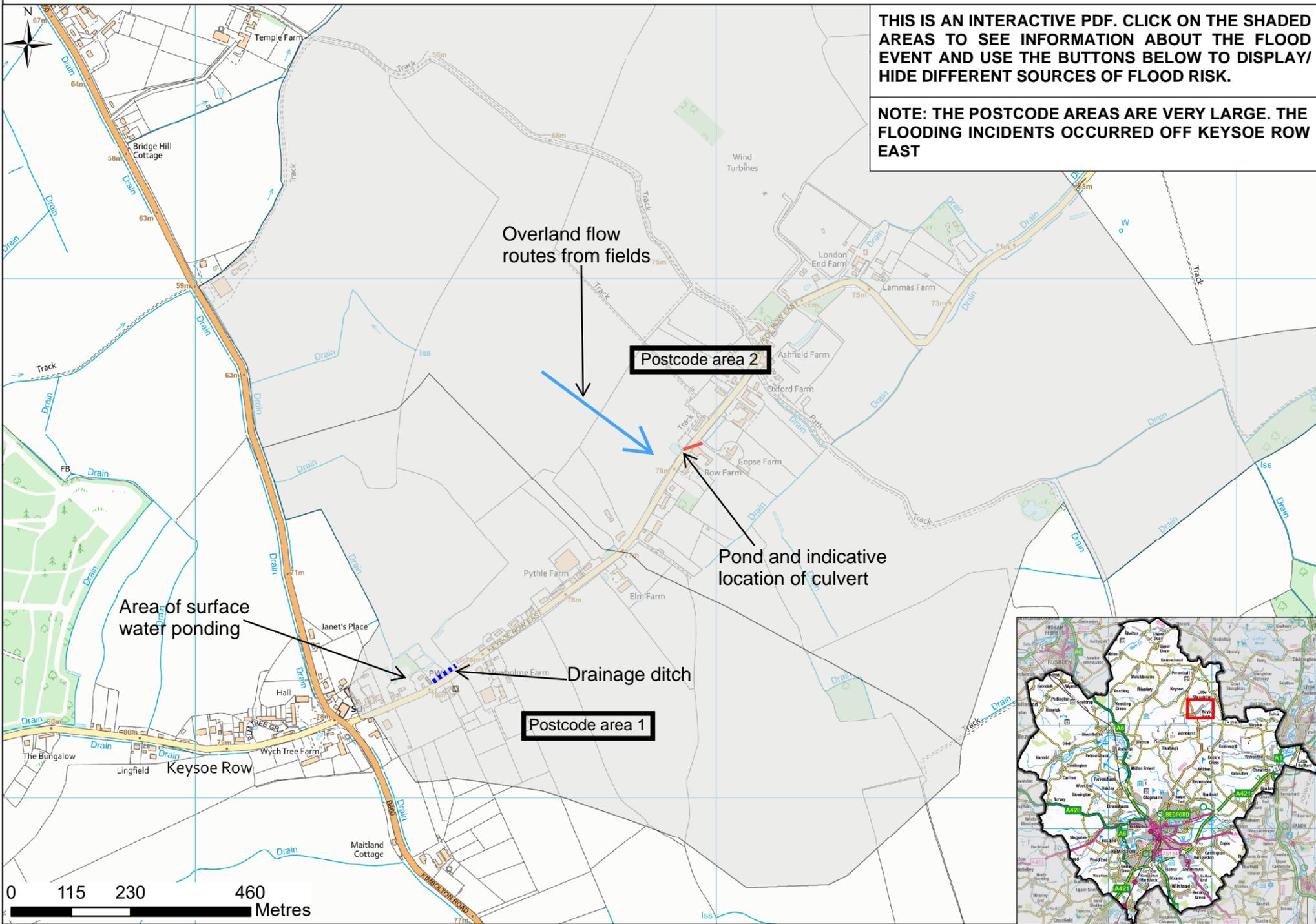


The area around Keysoe Row East in the Bolnhurst and Keysoe civil parish suffered flooding in December 2020. Under the Flood and Water Management Act 2010, Bedford Borough Council as the Lead Local Flood Authority (LLFA) has the duty to investigate the flood event. The scope of this flood investigation 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.



THIS IS AN INTERACTIVE PDF. CLICK ON THE SHADED AREAS TO SEE INFORMATION ABOUT THE FLOOD EVENT AND USE THE BUTTONS BELOW TO DISPLAY/HIDE DIFFERENT SOURCES OF FLOOD RISK.

NOTE: THE POSTCODE AREAS ARE VERY LARGE. THE FLOODING INCIDENTS OCCURRED OFF KEYSOE ROW EAST

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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)

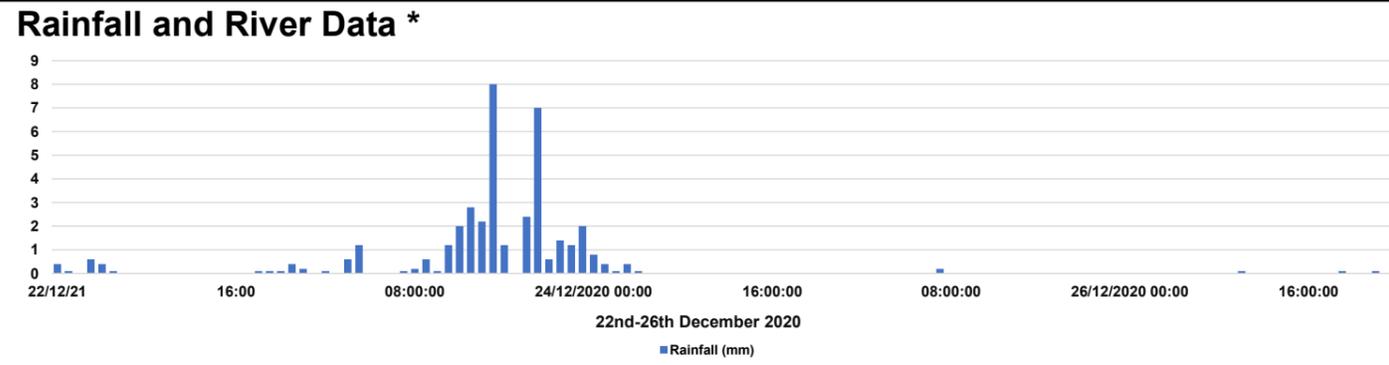
CLICK ON THESE BUTTONS

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	4.5 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 Keysoe Row East 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 a number of drainage ditches either side of Keysoe Row East and in the adjacent fields, but no significant watercourses or rivers. The ditches surrounding the affected areas appear to be isolated with no obvious discharge location. The flood mechanism at Keysoe Row East is therefore not expected to be related to river levels.

SOURCE OF FLOODING: Surface Water

FLOOD EVENT & CAUSE

Two residential properties reported internal flooding on December 23rd. One property reported water seeping in through the wall from an adjacent ditch, and the other property reported water encroaching through the garden and patio door from an adjacent pond and fields.

Postcode area 1: It is thought that the heavy rainfall overwhelmed the capacity of the drainage ditch running parallel to the northern side of Keysoe Row East adjacent to one of the properties. This flood mechanism is consistent with the Environment Agency Flood Risk from Surface Water mapping¹, which shows that the property is located adjacent to an area at 'high' risk of surface water flooding, meaning that the chance of flooding is greater than 3.3% in any given year. The mapping shows areas of surface water ponding within and surrounding the property, which suggests that the area is a localised low point where surface water runoff is likely to pond following heavy rainfall events. In addition, the British Geological Survey (BGS) records² show that the underlying geology is a classified Secondary Aquifer, which means there is the potential for elevated groundwater. It is thought that elevated groundwater contributed to the floodwater that reportedly seeped through the walls.

Postcode area 2: There is a natural pond located just west of the other affected property to the north of Keysoe Row East. The outfall of the pond is culverted beneath the road and discharges into a drainage ditch. It was reported that the culvert beneath the road was blocked during the flood event, such that water backed up and overtopped the banks of the pond. In addition, the heavy rainfall is thought to have caused overland flow routes on the fields to the northwest, contributing to the flooding experienced. This flood mechanism is partially consistent with the Environment Agency mapping, which shows that the area just east of the pond is at 'high' risk of surface water flooding. The affected property itself is shown at 'low' risk of surface water flooding (chance of flooding between 0.1% and 1% in any given year), however, the blocked culvert would have caused more water to back up than would be expected.

In conclusion, 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 run off into drainage ditches and form overland flow routes. It is thought that a combination of heavy rainfall, overland flow routes, and a blocked culvert contributed to the flooding experienced. Any maintenance issues with ditches and highway drainage along Keysoe Row East would have exacerbated the flooding.

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 7:48:** Fire service provided flooding advice to residents in the area.
- **24/12/2020 daytime:** LLFA officers visited those flooded on December 23rd to gain information on 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 highway drainage on Keysoe Row East including the culvert connecting the pond to the ditch and clear any debris. This was completed in February and March 2021.	Bedford Highways
Complete	Liase with the landowner to maintain the drainage ditches and ponds adjacent to Keysoe Row East to provide additional capacity and potentially reduce flooding at the affected properties.	Lead Local Flood Authority / Landowners
Ongoing	Investigate the potential benefits of constructing a new headwall to ensure the pond drainage mechanism works effectively and water can discharge freely.	Bedford Highways
Medium term (6-12 months)	Investigate the suitability of flood protection measures for the affected properties (e.g. flood barriers, waterproof wall sealant, non-return valves, etc.), develop a flood action plan, and investigate the condition of drainage features. Specialist advice should be sought from a Property Flood Resilience (PFR) surveyor.	Property owner
Medium term (6-12 months)	Investigate the potential benefits and local appetite for a community flood group. The flood group should enable access to flood kits, flood action plans, and information about flood warnings/alerts and PFR.	Lead Local Flood Authority
Long term (2-4 years)	Investigate the potential benefits of improvement works to local drainage, which could include additional highway/land drainage and formalising the pond to the north of Keysoe Row East to hold more surface water runoff from the surrounding fields and ditches.	Lead Local Flood Authority / Riparian Owner

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 map, <https://flood-warning-information.service.gov.uk/>, [accessed June 2021].

² Aquifer Designation Map, <https://magic.defra.gov.uk/magicmap.aspx>. [accessed June 2021].

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