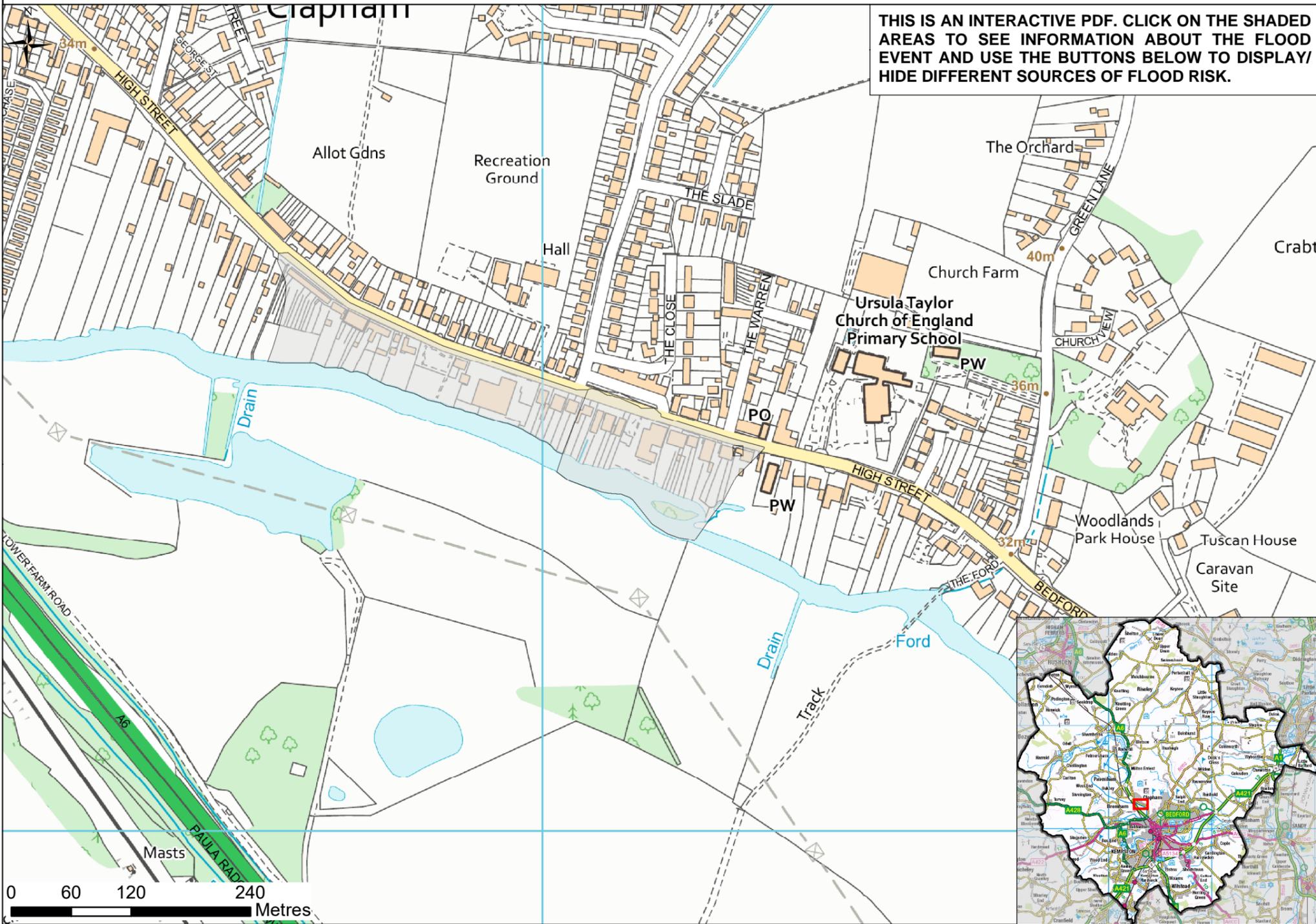


The village of Clapham suffered flooding in December 2020. Under the Flood and Water Management Act 2010, Bedford Borough Council as the Lead Local Flood Authority (LLFA) has the duty to investigate the flood event. The scope of this flood investigation is to identify the source, cause and impact of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

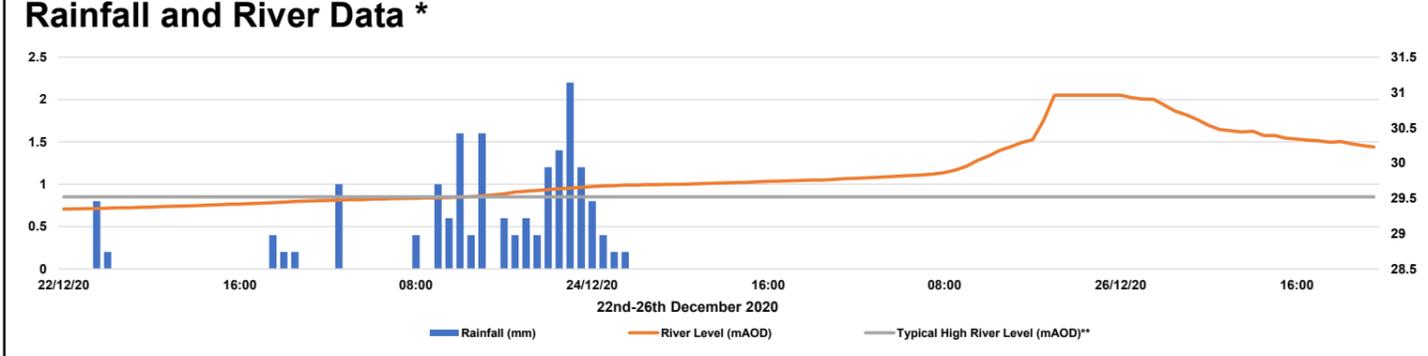
**CLICK ON THESE BUTTONS**

FLOOD MAP FOR PLANNING

RISK OF FLOODING FROM SURFACE WATER

FLOOD WARNING AREAS

BACKGROUND MAP



### Rainfall and River Gauges

Nearest Rain Gauge	Bedford
Distance to Gauge	5.98 km
Nearest River Gauge	Bromham
Distance to Gauge	2.48 km

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

### Rainfall and River Data Interpretation

The graph identifies that the main rainfall event at the nearest rainfall gauge to Clapham occurred between 19:00 on December 23rd and 03:00 on December 24th. The total rainfall volume is recorded as 17mm with a peak rainfall intensity of 2.2mm/hour. This single event saw a third of the 55mm of rainfall which is expected for the whole month of December on average.

The graph also shows that the river levels in the Great Ouse at the nearest gauge to Clapham were elevated above the 'typical high river level' from 14:00 on December 23rd and stayed above this level until beyond December 26th. The 'typical high river level' at the nearest gauge station is identified as 29.5m Above Ordnance Datum (AOD). River levels above this are only expected to be recorded 5% of the time.

**SOURCE OF FLOODING:** Main River (Fluvial)

## FLOOD EVENT & CAUSE

Four residential properties and one commercial property reported internal flooding to the ground floors and basements. One property reported flood depths up to waist height in the basement. The properties are located on the south side of High Street, backing onto the Great River Ouse. High Street was reported to be impassable due to the floodwater. The properties are located on the border between Environment Agency Flood Zone 2 and Flood Zone 3<sup>1</sup>. Flood Zone 2 are areas where the chance of river flooding is between 0.1% and 1% in any given year, and Flood Zone 3 are areas where the chance of flooding is greater than 1% in any given year. The Environment Agency Flood warning was issued only a few hours ahead of the flood event, giving the residents little time to prepare.

Blocked gullies were reported to Bedford Highways along High Street on December 29<sup>th</sup>. However, the high river levels in the River Great Ouse would have prevented the highway drainage from discharging freely regardless of their state of maintenance.

December 2020 was a very wet month with an average rainfall of 108mm across East Anglia, which is 95% higher than the December average<sup>2</sup>. The three months leading up to December also saw higher than average rainfall such that by December 23<sup>rd</sup> 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 watercourses and form overland flood flow routes. In addition, the British Geological Survey (BGS) records<sup>3</sup> show that the geology beneath the area is a designated aquifer, which means there is the potential for elevated groundwater beneath the site which could have contributed to the flooding reported in the basements. In conclusion, it is thought that the prolonged period of heavy rainfall, saturated ground conditions, and elevated groundwater levels contributed to the River Great Ouse overtopping its banks. It is likely that the flooding was also exacerbated by highway drainage backing up as water was unable to discharge freely due to high river levels.

## FLOOD WARNINGS & IMMEDIATE RESPONSE

- **22/12/2020 08:57:** Environment Agency Flood Alert Middle River Great Ouse in Milton Keynes, Bedford Borough and Central Bedfordshire issued.
- **23/12/2020 16:44:** Fire service provided flooding advice to residents.
- **24/12/2020 evening:** Police volunteers mass leaflet drop to warn residents of likely flooding.
- **25/12/2020 05:46:** Environment Agency Flood Warning River Great Ouse at Oakley and Clapham issued.
- **25/12/2020:** Lead Local Flood Authority (LLFA) visit to provide assistance on the ground.
- **25/12/2020 10:20 – 14:30:** Fire service provided flooding advice to residents.
- **25/12/2020 14:30:** Flooding experienced in the wider area declared a major incident by Bedford Borough Council.
- **25/12/2020 18:50:** Fire service and volunteers deploy aqua sacs to protect residential care home.
- **26/12/2020 10:17:** Fire service provided flooding advice to resident.
- **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 highway drainage along High Street and clear any blockages. Blockages were cleared in March 2021.	Bedford Highways
Complete	Set up a community flood group. The flood group should enable access to flood kits, flood action plans, and information about flood warnings/alerts and Property Flood Resilience (PFR).	Lead Local Flood Authority
Ongoing	Continued engagement with and support of the community flood group to enable preparedness in the event of a future flood.	Lead Local Flood Authority
Inspections short term (1-6 months) Remedial works as required	Inspect Main River assets (sluices, weirs, gates, locks and river banks) and identify the requirement for remedial works. Over 5,000 checks are already complete across East Anglia (95% of relevant assets), with 22 assets identified as being in need of remedial works in the wider area <sup>4</sup> .	Environment Agency
Medium term (6-12 months)	Investigate the suitability of flood protection measures for affected properties (e.g. flood barriers, waterproof wall sealant, non-return valves, etc.) and develop a flood action plan. Specialist advice should be sought from a Property Flood Resilience (PFR) surveyor.	Homeowner
Medium term (6-12 months)	Investigate improvements to the Flood Warning system. This warning is already included as medium priority in the Flood Warning Improvement Plan.	Environment Agency

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<sup>1</sup> Environment Agency Flood Map for Planning. <https://flood-map-for-planning.service.gov.uk/>. [accessed June 2021].

<sup>2</sup> Environment Agency, December 2020 Flooding Great Ouse Catchment Summary.

<sup>3</sup> Aquifer Designation Map, <https://magic.defra.gov.uk/magicmap.aspx>. [accessed June 2021].

<sup>4</sup> Environment Agency, May 2021. Harrold Winter Flooding Briefing.