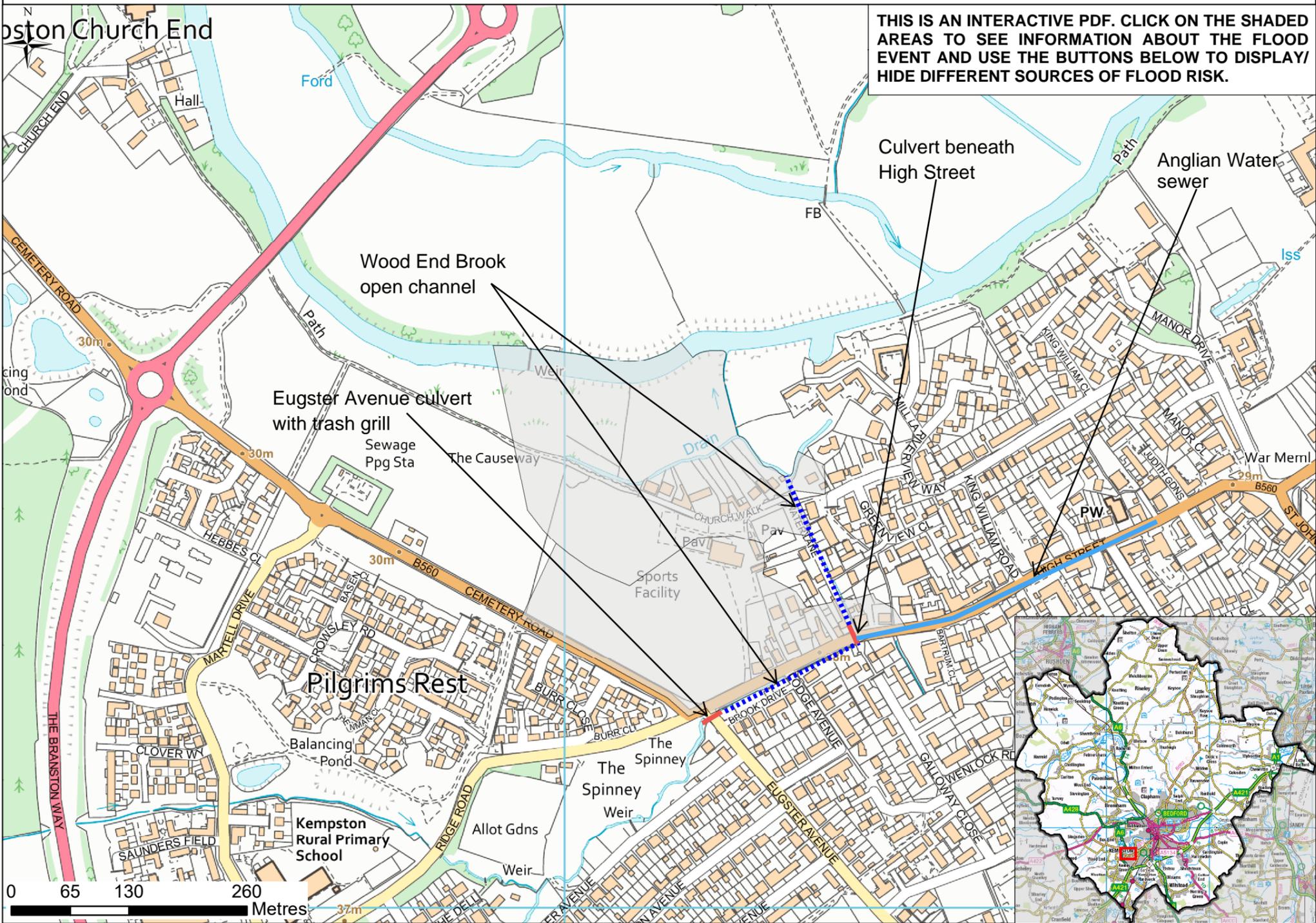


The area around Church Walk/High Street in the town of Kempston suffered flooding in December 2020. Under the Flood and Water Management Act 2010, Bedford Borough Council as the Lead Local Flood Authority (LLFA) has the duty to investigate the flood event. The scope of this flood investigation is to 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)

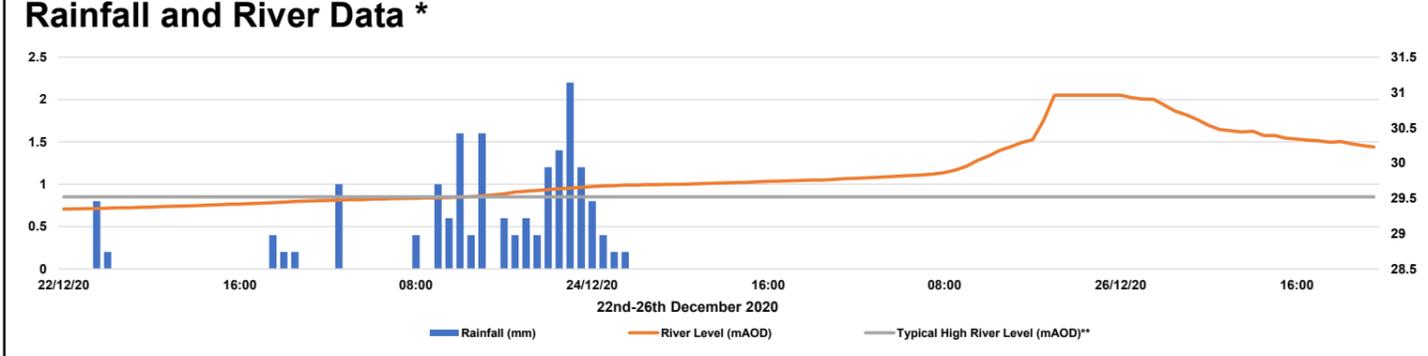
CLICK ON THESE BUTTONS

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	6.43 km
Nearest River Gauge	Bromham
Distance to Gauge	3.46 km

Rainfall and River Data Interpretation

The graph identifies that the main rainfall event at the nearest rainfall gauge to the Church Walk/High Street area in Kempston 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 the Church Walk/High Street area in Kempston 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 / Watercourse

FLOOD EVENT & CAUSE

Five residential properties reported internal flooding to the ground floor and basements, with flood depths between 10mm and 300mm. The residents reported loss of gas, electricity, and telephone connection. Residents of two properties moved out due to the damage caused, one of them staying with family. Water Lane and Church Walk were reported to be impassable due to the floodwater. Four of the properties are located near Church Walk and are in Environment Agency Flood Zone 3¹, which means that the chance of river flooding is greater than 1% in any given year. The fifth property is located off High Street at the border between Flood Zone 3 and Flood Zone 2. Flood Zone 2 are areas where the chance of river flooding is between 0.1% and 1% in any given year. The Environment Agency Flood Warning was issued only a few hours ahead of the flood, giving the residents little time to prepare. The Environment Agency Flood Map for Planning flood outlines suggest that the flooding experienced at the properties near Church Walk was caused by a combination of the River Great Ouse overtopping its banks and floodwater from the Wood End Brook.

The Wood End Brook flows open channel from the Spinney in the south-west towards High Street. It is culverted beneath Eugster Avenue and then continues open channel adjacent to High Street. The Brook is culverted again beneath High Street and then flows open channel along Water Lane before discharging towards the River Great Ouse. There is an Anglian Water sewer (see map annotation) which also discharges into the Brook at the Water Lane/High Street intersection. It was reported that water backed up at the Eugster Avenue culvert and flooded the area around the Spinney. It was also reported that water overtopped out of gullies onto High Street, contributing to the flooding experienced at the property located off High Street. It is thought that the heavy rainfall experienced in the area meant that the volume of water in the Wood End Brook system and the Anglian Water sewer overwhelmed the capacity of the culverts and the watercourse channel. In addition, the high river levels in the River Great Ouse would have prevented the Brook from discharging freely, pushing water upstream, further exacerbating the flooding experienced. It was reported to Bedford Highways in January 2021 that the trash grill on the Eugster Avenue culvert and a gully on High Street were blocked. It is not clear whether the trash grill or highway drainage around Church Walk, High Street, or Water Lane had been maintained prior to the flood event, but any debris build-up or blockages would have exacerbated the flooding experienced.

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 average². The three months leading up to December also saw higher than average rainfall such that by December 25th 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 the watercourses and sewers. It is thought that this prolonged period of heavy rainfall and high river levels contributed to flooding experienced.

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.
- **24/12/2020 evening:** Police volunteers mass leaflet drop to warn residents of likely flooding.
- **25/12/2020 05:46:** Environment Agency Flood Warning Low Lying Areas Close to the River Great Ouse at Kempston issued.
- **25/12/2020:** Lead Local Flood Authority (LLFA) visit to provide assistance on the ground.
- **25/12/2020 09:14, 15:55:** 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.
- **26/12/2020 01:20 – 14:00:** Fire service provided flooding advice to residents in the area.
- **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 and culverts in the area around High Street, Eugster Avenue, and Water Lane to clear any blockages. This was completed in January 2021.	Bedford Highways
Ongoing	Investigate the potential for drainage and flood risk improvements along Kempston High Street, Church Walk, and Water Lane. The scope of these works is currently being defined in order to take this forward with a consultant team.	Lead Local Flood Authority
Ongoing	Investigate the potential for Natural Flood Management (NFM) in the form of a flood storage area upstream along Wood End Brook to hold back floodwater. The scope of these works is currently being defined in order to take this forward with a consultant team.	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 ³ .	Environment Agency
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 Property Flood Resilience (PFR).	Lead Local Flood Authority
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

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 Map for Planning, <https://flood-map-for-planning.service.gov.uk/>, [accessed June 2021].

² Environment Agency, December 2020 Flooding Great Ouse Catchment Summary.

³ Environment Agency, May 2021. Harrold Winter Flooding Briefing.