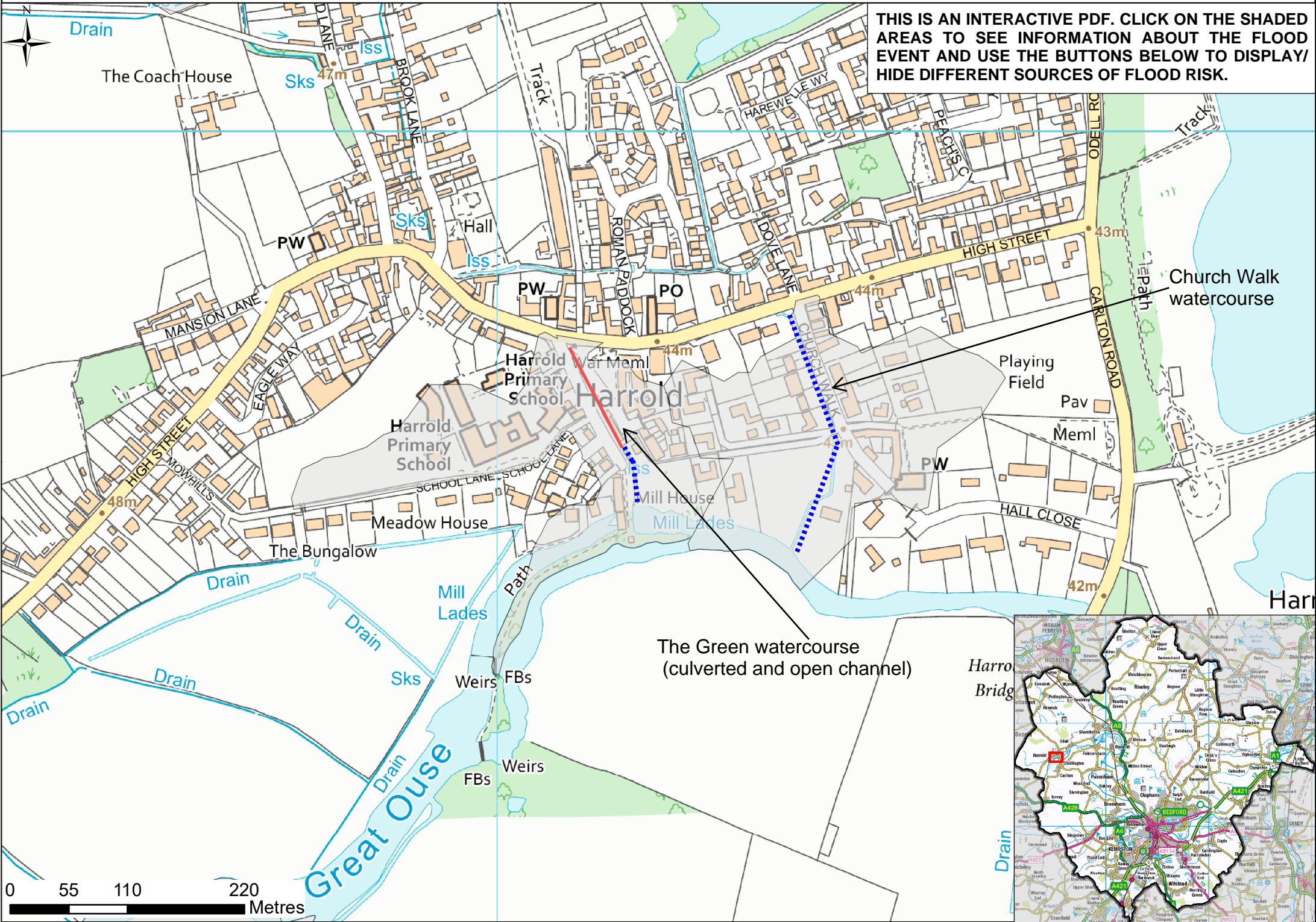


The village of Harrold suffered flooding in December 2020. Under the Flood and Water Management Act 2010, Bedford Borough Council as the Lead Local Flood Authority (LLFA) has the duty to investigate the flood event. The scope of this flood investigation is to identify the source, cause and impact of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

Flood Map for Planning

Flood Zone 3

Flood Zone 2

Areas benefitting from flood defences

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

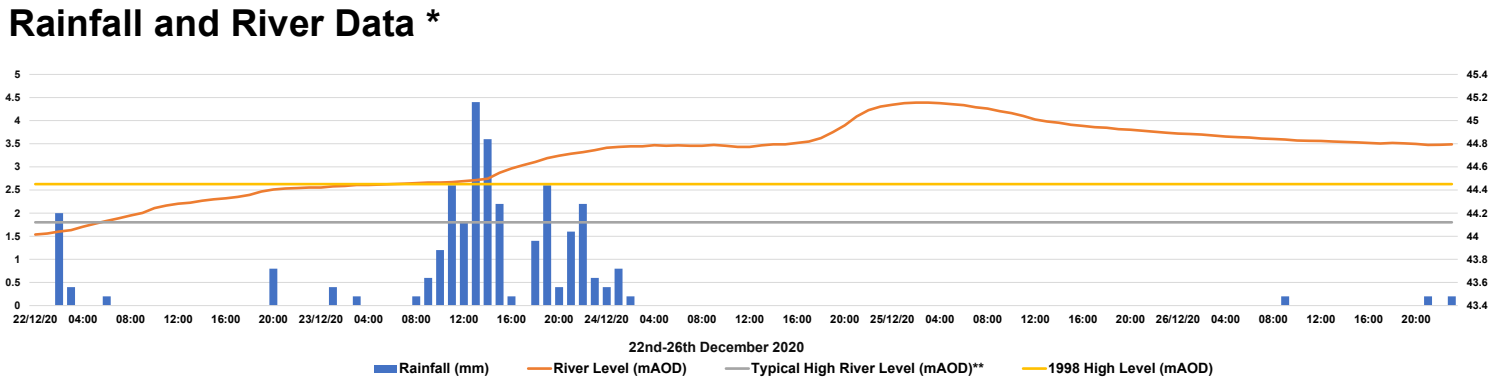
FLOOD MAP FOR PLANNING

RISK OF FLOODING FROM SURFACE WATER

FLOOD WARNING AREAS

BACKGROUND MAP

Rainfall and River Data *



22nd-26th December 2020

■ Rainfall (mm) — River Level (mAOD) — Typical High River Level (mAOD)** — 1998 High Level (mAOD)

Rainfall and River Gauges

Nearest Rain Gauge	Olney
Distance to Gauge	7.78 km
Nearest River Gauge	Turvey
Distance to Gauge	4.73 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 Harrold occurred between 08:00 on December 23rd and 03:00 on December 24th. The total rainfall volume is recorded as 27mm with a peak rainfall intensity of 4.4mm/hour. This single event saw just under half of the 55mm of rainfall which is expected for the whole month of December on average.

The graph shows that the river levels in the Great Ouse were elevated above the ‘typical high river level’ from the early hours of December 22nd and stayed above this level until beyond December 26th. The ‘typical high river level’ at the nearest gauge station is identified as 44.1m Above Ordnance Datum (AOD). River levels above this are only expected to be recorded 5% of the time. For context, the 1998 peak flood level is included, which was recorded at 44.45m AOD, and the graph shows that the December 2020 river levels exceeded the 1998 level from approximately 02:00 on December 23rd.

This document should be viewed in PDF format. Information may be lost when printed

ORIGINATED	BG	14/07/2021	CHECKED	NB	15/07/2021	VERIFIED	MT	16/07/2021	
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SOURCE OF FLOODING: Main River / Watercourse

FLOOD EVENT & CAUSE

Four residential properties reported internal flooding between the evening of December 23rd and December 25th. The affected residents reported flood depths between 150mm and 600mm with damage throughout the properties, as well as loss of electricity within a garage. One resident used compost bags and a pump to try to protect against water ingress. Carlton Road and the bridge across the River Great Ouse in Harrold were reported to be impassable due to the floodwater. The Environment Agency Flood Warning was not issued at Harrold.

One of the affected properties is located adjacent to The Green watercourse (see map annotation). The watercourse is culverted to the north of the property, and it was reported that water encroached the building from water overtopping at the culvert. Another affected property is located in the floodplain associated with the Church Walk watercourse (see map annotation). The property is located in Environment Agency Flood Zone 2¹, which means the chance of river flooding is between 0.1% and 1% in any given year. The high water levels in the River Great Ouse would have prevented the watercourses from discharging freely, pushing water upstream in the network and contributing to the flooding experienced. Two of the affected properties located near the Green are located directly in the River Great Ouse floodplain, in Environment Agency Flood Zone 2 and 3 respectively. Flood Zone 3 are areas where the chance of river flooding is greater than 1% 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 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 watercourses and form overland flood flow routes. In conclusion, it is thought that the prolonged period of heavy rainfall and saturated ground conditions contributed to the River Great Ouse overtopping its banks. In addition, the high river levels in the River Great Ouse would have prevented the watercourses and drainage systems within Harrold from discharging freely, exacerbating the flooding experienced. Any highway drainage maintenance issues would have further worsened the flooding.

FLOOD WARNINGS & INITIAL RESPONSE

- **22/12/2020 08:57:** Environment Agency Flood Alert Middle River Great Ouse in Milton Keynes, Bedford Borough and Central Bedfordshire issued.
- **Not issued:** Environment Agency Flood Warning River Great Ouse at Harrold.
- **23/12/2021 16:20 – 21:00:** Fire service inspected properties and provided flooding advice to residents in the area.
- **24/12/2021 daytime:** Lead Local Flood Authority (LLFA) visited those who flooded on December 23rd to gain information on the damage caused and offer assistance.
- **25/12/2021 02:05 – 05:10:** Fire service provided flood preparation guidance and responded to request for sandbags.
- **25/12/2021 08:21:** Fire service rescued affected persons from flooded property.
- **25/12/2020 14:30:** Flooding experienced in the wider area declared a major incident by Bedford Borough Council.
- **26/12/2020 10:28:** Fire service provided flooding advice to resident.
- **28/12/2020:** LLFA, Bedford Flood Response Team, and volunteers from the Council visited 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. This was completed around Odell Road/Carlton Road in February 2021 and around Dove Lane in June 2021.	Bedford Highways
Complete	Set up a community flood group. A flood kit has now been issued and a flood plan has been written.	Lead Local Flood Authority
Ongoing	Continued engagement with and support of the community flood group. The flood group should enable access to the flood kits, flood action plans, and information about flood warnings/alerts and Property Flood Resilience (PFR).	Lead Local Flood Authority
Inspections short term (1-6 months)	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
Remedial works as required		
Medium term (6-12 months)	Undertake a capacity assessment of the culvert at The Green watercourse to identify the requirement for improvement works.	Lead Local Flood Authority
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.). 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 as no flood warning was issued. This warning is already included as high priority in the Environment Agency's 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.