



Buckinghamshire Council Detailed Flood Report

Buckingham, November 2024

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1. Introduction

Following extensive flooding in Buckingham on the 24th and 25th of November 2024, Buckinghamshire Council as the Lead Local Flood Authority (LLFA) has taken the decision to produce an addendum to the previous Section 19 Flood Investigation Report from 2020 to create a formal flood record of the event to support our flood record database.

Flooding occurred in Buckingham from 21:00 on 24th November, until 16:00 on the 25th of November 2024 and resulted in internal property flooding to at least fifty properties. This was as a result of heavy rainfall (from Storm Bert) on the 23rd and 24th of November falling on already saturated soils.

Following the event, the LLFA and the Environment Agency (EA) disseminated online flood questionnaires to the community to better understand the extent and impact of the flooding, and members of Flood Action 4 Buckingham worked with the local MP to collate additional data post event at the request of local councillor, to support council efforts

The key focus of this addendum is to provide a brief summary of the context and impacts of this flooding event, and provide a progress update on the recommendations made in the Buckingham 2020 Section 19 Flood Investigation Report. It is not intended as a stand-alone report and therefore should be read in the context of the comprehensive investigation undertaken into the December 2020 flooding.

For further information regarding the location of Buckingham within Buckinghamshire, catchment characteristics, flood risk, wider flood history, and flood risk management, please refer to the Buckingham December 2020 Section 19 Flood Investigation Report, published on Buckinghamshire Council's website¹.

2. Hydrological Analysis

Antecedent catchment conditions

In the year prior to the November 2024 flood event, rainfall levels were high across the East Anglia Region. Buckingham sits in the most westerly area of the EA's East Anglia Region, The Upper Bedford Ouse. The November 2024 Water Situation Report for East Anglia shows that, in that area, monthly average rainfall values were exceeded in 10 of the 12 months preceding November, as shown in figure 1 below. September rainfall levels were significantly elevated.

¹ https://www.buckinghamshire.gov.uk/documents/16100/buckingham_technical_report-final-sept-2021-v1_V3sC5LE.pdf

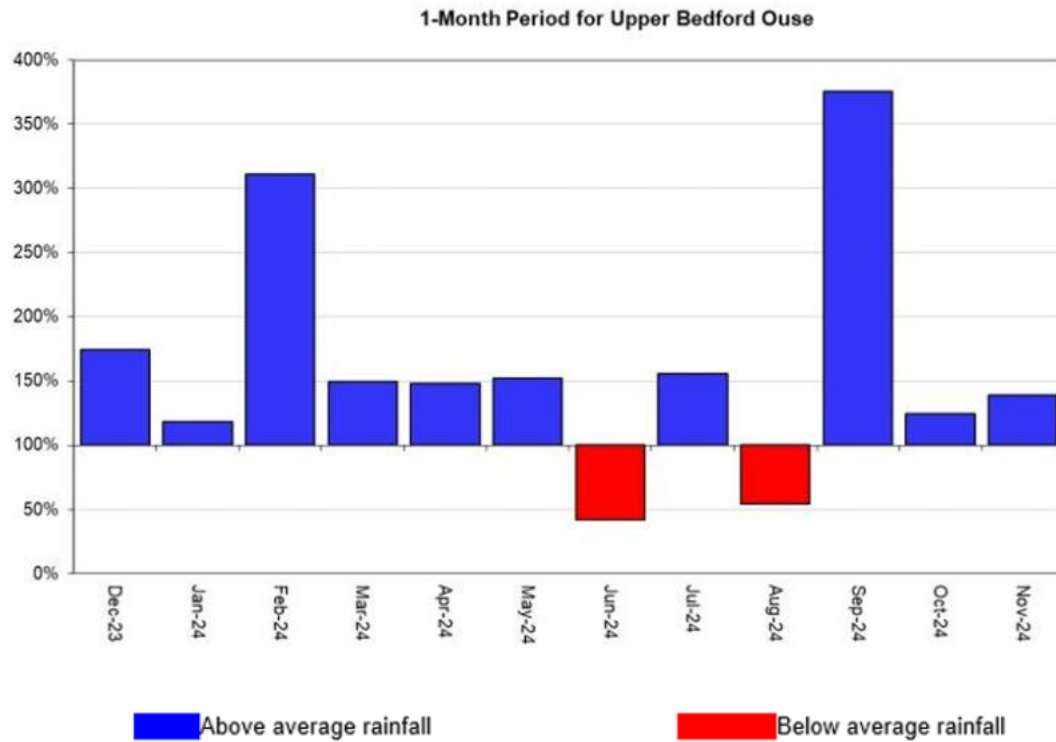


Figure 1. Rainfall graph for the Upper Bedford Ouse in East Anglia Region, taken from EA Water Situation Report November 2024

The sub-catchment around Buckingham experienced total rainfall of 158%, 147%, and 211% of the long-term average rainfall for the 12, 6 and 3 month periods leading up to the flood event. These rainfall levels were all classed as exceptionally high, as shown in Figure 2. The total monthly rainfall in November itself was slightly less extreme, although still above normal.

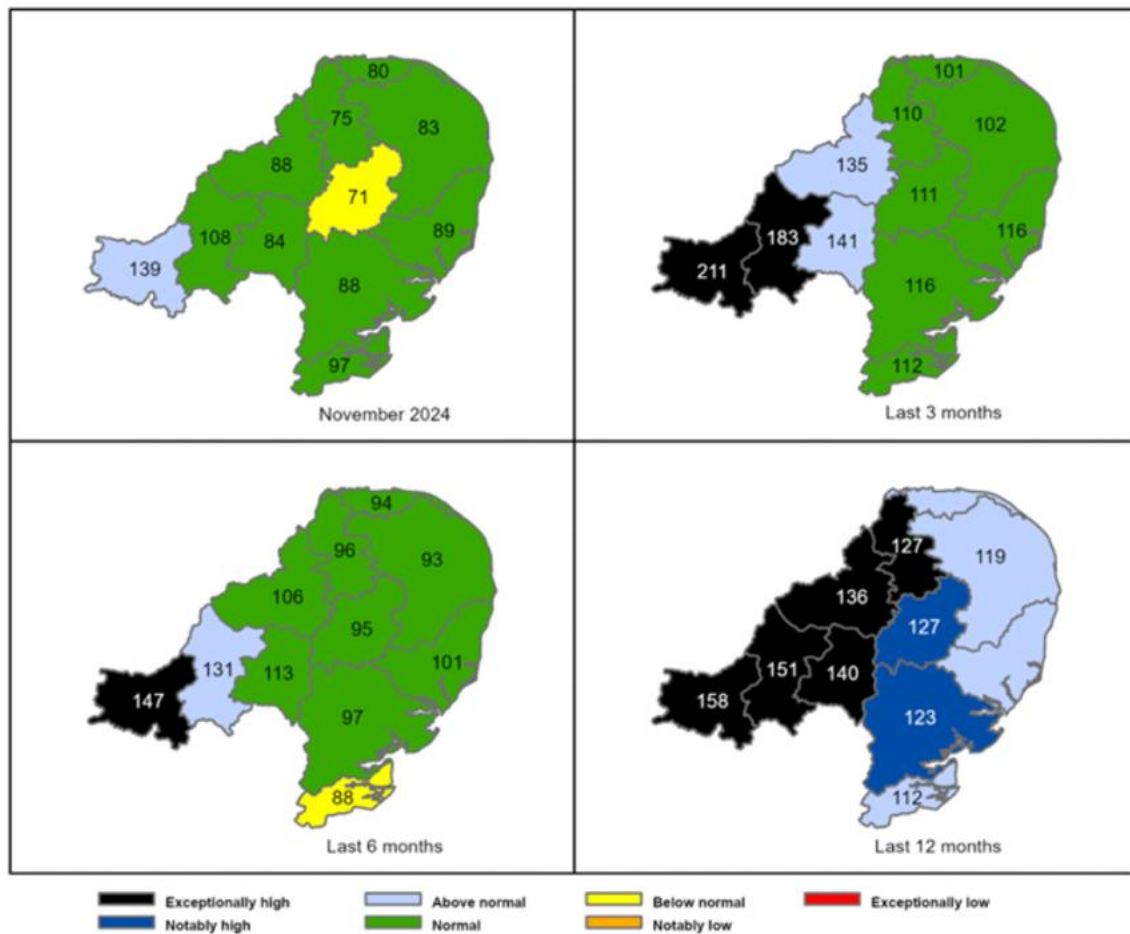


Figure 2. Total rainfall for East Anglia Region, taken from EA East Anglia Water Situation Report November 2024. (Buckingham is located in the most western sub-catchment of the East Anglia Region) ²

The consistently high rainfall recorded from December 2023 to November 2024 resulted in elevated groundwater levels and saturated soils by the time of the storm event. The soil moisture deficit³ was below 10mm in November 2024, indicating that the catchment had minimal capacity to store additional rainfall.

² _Categories:

- Exceptionally high: Value likely to fall within this band 5% of the time.
- Notably high: Value likely to fall within this band 8% of the time.
- Above normal: Value likely to fall within this band 15% of the time.
- Normal: Value likely to fall within this band 44% of the time.
- Below normal: Value likely to fall within this band 15% of the time.
- Notably low: Value likely to fall within this band 8% of the time
- Exceptionally low: Value likely to fall within this band 5% of the time.

³ Soil Moisture Deficit: “The difference between the amount of water actually in the soil and the amount of water the soil can hold. Expressed in depth of water (mm)”, East Anglia Water Situation Report November 2024, [East Anglia Water Situation Report November 2024](#)

The River Great Ouse at Buckingham has a contributing upstream catchment area of 143km². There are several ordinary watercourses within and around the town, including Badgers Brook, which joins the Great Ouse from the south.

River levels on the Great Ouse in Buckingham are recorded at Tingewick Road Bridge gauging station. Figure 3 shows levels from June 2024 through to June 2025. Peaks in water levels typically follow peaks in rainfall, with multiple peaks recorded during the wet month of September before levels slowly declined through October 2024.



Figure 3. River Great Ouse Level levels recorded at Tingewick Road Bridge for the River Great Ouse at Buckingham from June 2024 to June 2025. Source: Shoothill Gauge Map (July 2025).

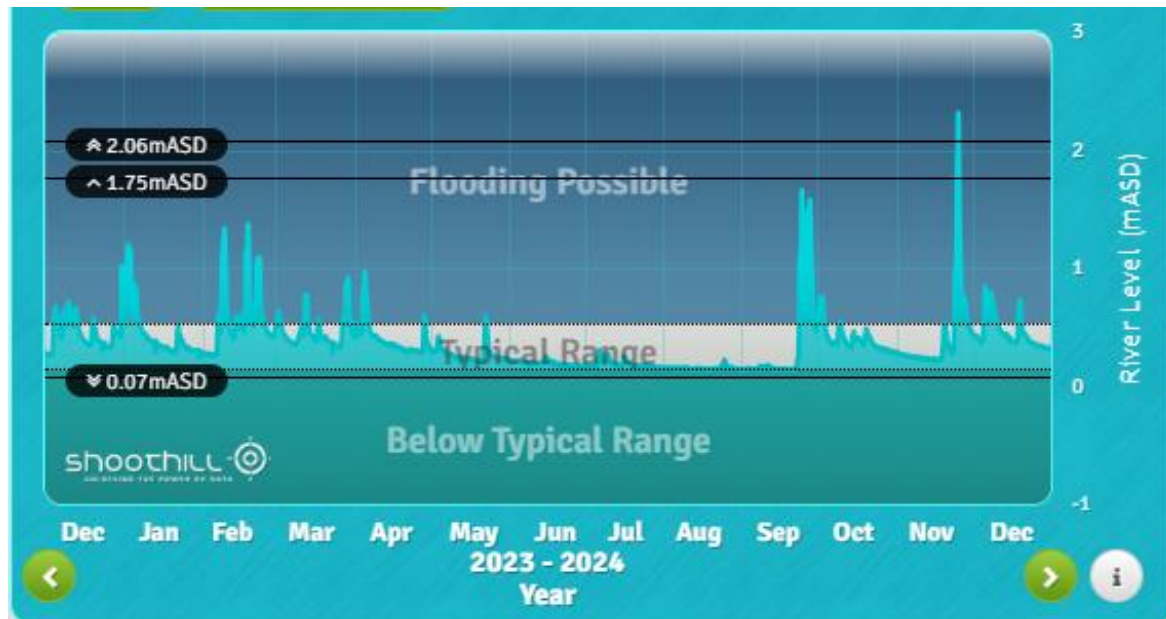


Figure 3. River Great Ouse levels recorded at Tingewick Road Bridge for the River Great Ouse at Buckingham from Jan 2024 to December 2025. Taken from Shoothill Gauge Map (March 2026)

The Event: November 2024

Rainfall

Whilst the closest rain gauge to Buckingham is located at Foxcote, data from the rain gauge at Brackley is considered to be more reliable due to ongoing data quality issues at Foxcote. Brackley is located 15km upstream of Buckingham within the upper part of the Great Ouse catchment.

Figure 4 shows that rain fell at Brackley from the early hours of 23rd November 2024 until late in the evening on the 24th November, peaking in intensity around 18:00 on 24th November 2024 at 11 mm per hour.

In total, 57mm of rainfall fell at Brackley between 04:00 on the 23rd to 22:30 on the 24th Nov. Such a rainfall event has a 12.5% (or 1 in 8) chance of occurring in any one year. This is not especially extreme but given that the soils were already saturated from the notably high rainfall over preceding months, the catchment was very sensitive to heavy rainfall.

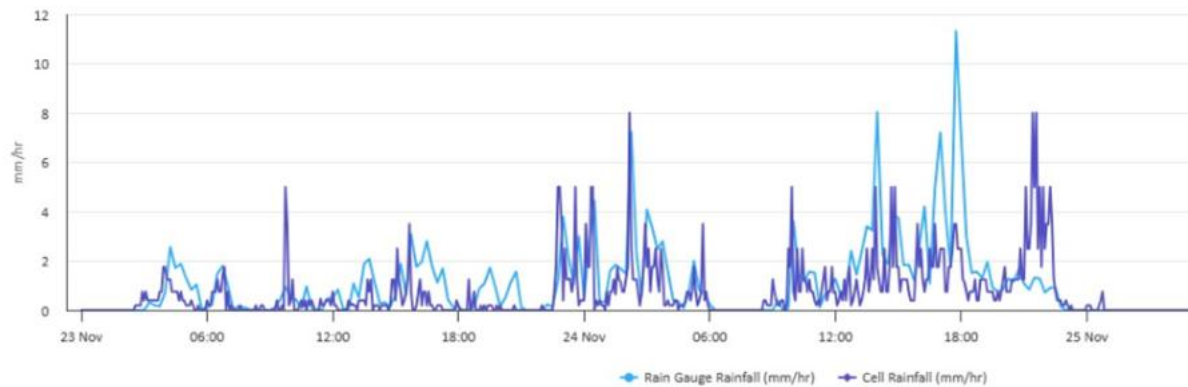


Figure 4. Rainfall at Brackley Rain Gauge, taken from Metasphere using Environment Agency data.

It should be noted that some residents of Buckingham reported that they felt less rainfall had fallen than in previous flood events, and that the severity of flooding appeared disproportionate to the rainfall amounts witnessed. Although there are no rain gauges in Buckingham itself, rainfall radar for the entire catchment area suggests that the bulk of the rainfall fell in the upper catchment, with totals in the upper catchment, such as at Brackley (discussed above), significantly higher than in areas such as Buckingham further downstream. It is therefore likely that the high water levels in Buckingham were predominantly driven by the significantly greater rainfall in the upper catchment rather than rainfall that fell near the town itself.

Hydrological Response

The river levels increased as rainfall falling over the preceding 48 hours in the catchment area, particularly in the upper catchment, found its way into the River Great Ouse. Between the onset of the recorded rainfall and time of the peak river level, surface water runoff generated locally at Buckingham was also making its way into the river system via overland flow and drainage systems. Given that the soil was already completely saturated, very little of the storm's rainwater could have been absorbed and retained within the soil, and so water would have rapidly reached watercourses.

As seen in Figure 5 the River Great Ouse water level began to rise in the evening of 23rd November. There were then a few hours on the 24th November when the river level plateaued at 79.6mAOD, followed by a quick rise before it reached the peak (Figure 5). This pattern matches the description of the flooding given by local residents in questionnaire responses. This could have been due to the multiple peaks in rainfall experienced throughout the 23rd and 24th November.

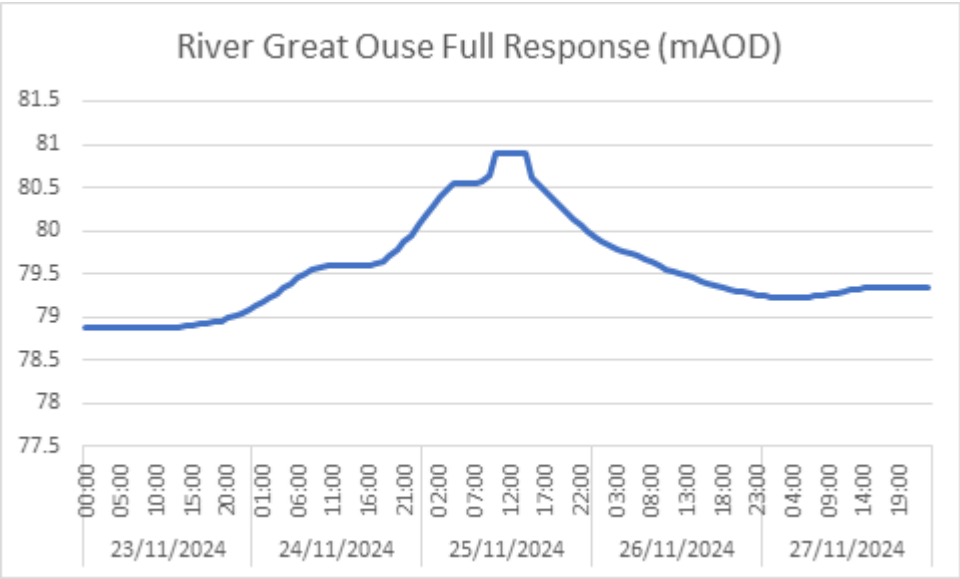


Figure 5: River Great Ouse water level, recorded at Tingewick Road Bridge in Buckingham, rising and falling from the 23rd to 27th November. Environment Agency (2025)

River levels at Buckingham, measured on the above mentioned Tingewick Road Bridge gauge, peaked on the 25th November 2025 between 9:30 and 14:00. The River Great Ouse rose above the maximum recording range (80.8mAOD) of the Gauge during this period, seen as a flat line in the trace shown below, and therefore the true peak is likely to be higher than that recorded.

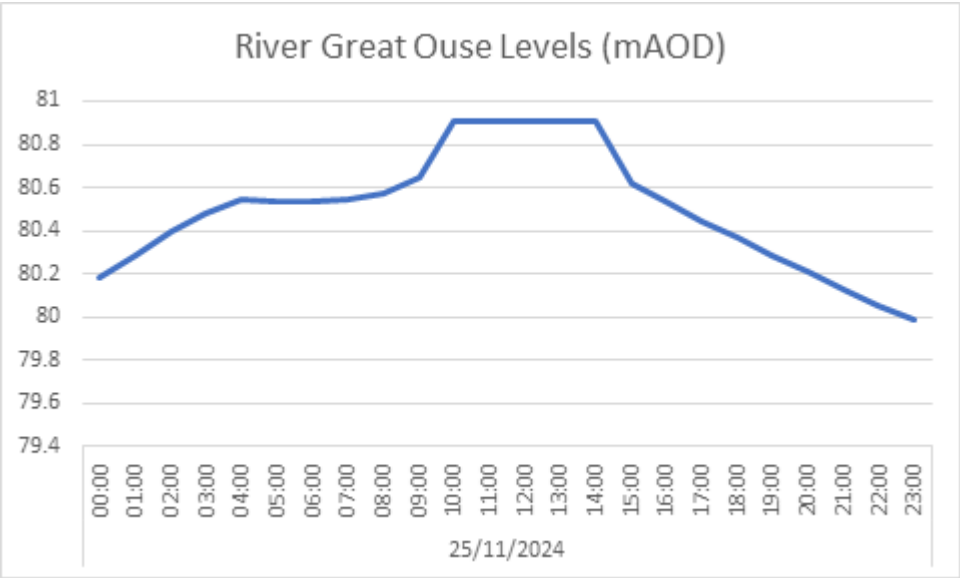


Figure 6: River Great Ouse water level, recorded at Tingewick Road Bridge in Buckingham, showing the levels exceeding the gauge tolerance between 09:00 & 14:00 on 24th Nov 2024. Environment Agency (2025)

3. Source-Pathway-Receptor Analysis

Source

Similar to the 2020 flood event, the predominant source of flooding on the 25th November was high water levels on the River Great Ouse. However, evidence from the local community shows water also entered properties from under floors, and sewerage was reported in flood water, indicating groundwater flooding and overwhelmed drainage systems.

The River Great Ouse's high levels and flow rates, caused by heavy prolonged rainfall falling on a saturated catchment upstream of Buckingham, meant that channel capacity was exceeded and floodwater spilled out onto the floodplain.

The same rainfall generated surface water runoff locally, which quickly overwhelmed drainage systems and combined foul sewers. The high levels on the River Great Ouse meant drainage systems were unable to discharge into the river, exacerbating the surface water flooding seen.

As detailed in the 2020 Section 19 Report for Buckingham, there are alluvial gravel deposits near the river. The exceptional rainfall prior to November, combined with the 23rd/24th November rainfall event, is likely to have raised groundwater levels above ground level, leading to groundwater flooding in places. However, it is unlikely that this was a key source of flooding.

Pathway

Due to the high levels of rainfall experienced, the river level exceeded the bank level and flowed onto the surrounding floodplain. Roads and other impermeable surfaces became direct pathways for surface water to run off along with flood waters from the river. In some locations, the highway drainage system became overwhelmed and surcharged from manholes. As the river levels were high, surface water drainage systems were unable to discharge into the river, which contributed to surface water backing up and surcharging.

Surface water and flood water from the River Great Ouse entered and overwhelmed the foul sewer in places, causing surcharging and sewer flooding.

Pathways are similar to those identified in the December 2020 flood event, please see section 8.2 in the Section 19 flood investigation report on the December 2020 flood for further information.

Receptor

The LLFA and Environment Agency disseminated flood questionnaires after the event to gather first-hand information from those affected to understand the extent and impact of the flooding upon the community. The local flood action group, Flood Action 4 Buckingham, supported this and were instrumental in sharing questionnaires and gathering detail. The figures in this report are based on the information gathered. It is important to recognise that more flooding may have occurred that has not been reported to either the LLFA or the EA.

53 properties (a mixture of residential and business) reported internal flooding during the November 2024 event. Residents also reported the undercroft parking garage of Candleford Court flooded.

Figures 4.1 and 4.2 of the previous Section 19 flood investigation report for Buckingham show the risk of flooding from rivers and surface water. Properties reporting flooding in the November event are located within these outlines.

Internal flooding affected multiple streets. Table 1 shows the streets on which properties were internally flooded, along with the number of reports of internal flooding captured on each street. There was at least one report of floodwater entering properties through the floor on each of these streets, suggesting the presence of groundwater flooding in addition to fluvial flooding. In addition to this, sewer flooding was reported at Nelson Street, Ford Street, Chandos Road, and Bridge Street.

Street	No. of internal flooding reports
Brackley Road	1
Bridge Street	4
Chandos Road	9
Ford street	5
Hunter Street	3
Nelson Street	9
School lane	1
Victoria Row	5
Well Street	16

Table 1, streets affected by internal flooding, and the corresponding number of internal flooding reports made there.

As in the 2020 flood event, some residents were able to deploy Property Flood Resilience measures such as flood gates before flooding occurred. However, not all residents had them deployed in time, and several of those who did deploy gates still flooded internally. The Section 19 report from 2020 raised a number of questions around the effectiveness of these measures, including the age of the products, usage, and alteration of properties introducing new ingress routes. These points are still considered valid for the November 2024 flood event and therefore the recommendations made previously around this still stand (see below).

4. Incident response and Responsibilities

The Environment Agency (EA) is the lead risk management authority for fluvial flooding from main rivers such as the Great Ouse. The EA issued Flood Alerts and Warnings via text message, phone call or email to customers signed up to receive flood alerts and warnings. Although flood alerts and warnings were issued, there have been reports that these were not received in time or at all. The Environment Agency visited Buckingham following the flooding on the 25th of November 2024 to collect flood event data.

Buckinghamshire Council Resilience Service set up an Incident Management Team for the flooding across Buckinghamshire on 25th November to coordinate the Councils response and liaised with the EA, and Buckingham Town Council. **Buckinghamshire Council Highways** and **Buckingham Town Council** undertook on-site flood response activity, responding to over 60 call outs including sandbag distribution and road closures county-wide.

Property owners with Property Level Resilience Measures installed deployed these measures as well as sandbags to help protect their properties from flooding.

There is a publically available report of Buckinghamshire Fire & Rescue Service responding to one report of internal flooding affecting the ground floor of a house on Nelson Street, where 1ft of water was pumped from the front room. The local community are not clear as to which property this was, however they are aware of a fire engine being present on Well Street.

5. Recommendations

The 2020 Section 19 Flood Investigation resulted in a number of recommendations for a range of organisations and stakeholders to consider further. As noted in the 2020 report, Buckinghamshire Council does not have powers to enforce the delivery of the recommended activity by others, but has liaised with the key RMAs to provide an update on the actions taken in response to these recommendations:

Recommendations for Environment Agency	Action Taken (EA Response)
Raising the level gauge at Buckingham	This is on the EA programme
Invest further in flood modelling and mapping	New channel survey has been collected, and modelling study is ongoing. Project at the interim deliverables stage.
Install a flow gauge at Buckingham or upstream	A feasibility study has been completed which looked at the installation of a river flow site at the Buckingham University Grounds. This is on the EA programme, but timescales are currently unknown.
Consider how to capture aerial footage of key locations during a flood event	During the flooding in Autumn 2024, the EA successfully used in-house drones/RPAS (Remotely Piloted Aircraft Systems), to monitor our own assets and to capture the impacts that flooding was having on communities. On this occasion we were unable to deploy the RPAS team to Buckingham, however we did have staff on the ground talking to affected residents.
Improve the flood warning service for Buckingham. Verify and implement flood warning area extents and triggers improvements considering the flooding in Buckingham in December 2020 & November 2024.	November 2024 data was reviewed and used to update flood warning thresholds accordingly in March 2026. Our work to review the spatial extent of the flood warning areas is ongoing, amendments have been made to reflect the pattern of impacts observed in 2020 and further updates will be informed by the outputs of our modelling of the Upper River Great Ouse. An additional trigger has been added at Brackley gauge to enable issuing warnings if Buckingham gauge fails. We are working with Buckingham Council and Flood Action 4 Buckingham to encourage sign up to the warning service offered by the Environment Agency.

Develop a catchment-wide Flood Response Framework to ensure consistency in response between the different Local Resilience Forums which cover the Great Ouse catchment	The Flood Response Framework project has closed. All organisations within Local Resilience Forums across the River Great Ouse catchment continue to improve their knowledge and work better together during flood events.
Determine the ownership of the March Edge, Linden Village flood embankment, and take appropriate action to ensure there is a maintenance plan in place	The Environment Agency has determined that the embankment is jointly owned by third parties. The EA should advise owners of their responsibilities and consider “designating” it as a structure under Section 30 and Schedule 1 of the Flood and Water Management Act 2010. This would give it legal protection to ensure it cannot be altered, removed, or replaced without consideration and consent of the designating authority.
Review regular inspection and maintenance regime for the River Great Ouse through Buckingham in light of forthcoming results from new channel survey and hydraulic modelling. Should modelling indicate reduction in risk to people and property from enhanced channel conveyance, consider de-silting or dredging through Buckingham. Consider removal of obstructions in floodplain e.g. fences	The maintenance programme for statutory main rivers in the catchment is funded by a combination of government grant and local flood funding raised by Regional Flood & Coastal Committees. The programme is available online: https://www.gov.uk/government/publications/river-and-coastal-maintenance-programme. Please note that any dates given are subject to change due to incident response, adverse weather conditions, water level, and other factors. Modelling update provided above.
Appraise a suite of capital options for flood risk management in Buckingham. To include: Revisiting the viability for flood storage upstream of Buckingham, informed by the current study, “Flood Storage Options and Flow Conveyance in the Great Ouse Catchment”.	The Environment Agency is planning to undertake a re-assessment of the case for flood risk mitigation in Buckingham and the likelihood of achieving a technically viable and cost-beneficial solution, which involves a high-level appraisal of capital options. This initial assessment will consider PFR measures as part of the wider suite of options explored. We have secured a small allocation of funding in

Consideration of the viability of a new PFR scheme to augment existing scheme. (This could be informed by a study into the effectiveness of the existing PFR measures).	2025/26 to progress the initial stages of this work. The assessment needs to be supported by an updated hydraulic model and this work is in its early stages. Alongside the Initial Assessment, the Environment Agency is also progressing a wider study: The Great Ouse Strategic Flood Risk Interventions Study (GO-SIS). This aims to: 1. Better understand the current and future flood risk from fluvial and surface water sources. 2. Secondly, it aims to identify the most viable approaches to manage flood risk across the catchment considering future growth and climate change impacts. GO-SIS is split into phases.
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Recommendations for Anglian Water	Action Taken
Install flow monitors on combined and surface water sewer systems at March Edge	Completed in 2021
Model the sewer system and undertake further surveys into surface water connections to the combined sewer if appropriate	Completed in 2021
Appraise and implement options to prevent/reduce the occurrence of sewer flooding at March Edge	Completed in 2021
Use sewer flow monitor alarms to speed up response to flooding at March Edge and red flag 2-hour response time to resident reports of flooding at March Edge	Completed in 2021
Complete improvements at Buckingham Riverside pumping station (replacement of pump 2, adjust screen around emergency overflow, remove gate valve on inlet chamber)	Completed in 2021

Consider installing no-leak manholes or raising manholes at locations where river water enters sewer network	Completed in 2021
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Recommendations for Thames Valley Local Resilience Forum	Actions Taken
Develop virtual incident management and provide training and exercising preparations for ongoing incident management in an entirely virtual or mixed environment	The Resilience team continues to work closely with Buckingham stakeholders especially during times of adverse weather.

Recommendations for Buckingham Town Council and Local Community	Actions Taken
Complete the update of the Community Flood Plan and provide community training and exercising of the new Community Flood Plan. This could include engagement with residents around the use of PFR.	Ex Kamino was run over two days jointly between Buckingham Town Council (BTC) and Buckinghamshire Councils Resilience Team, which tested their flood plan, BTC warden deployment, setting up Incident Management Team and standdown procedure. Flood Action 4 Buckingham are now undertaking a review and update of the Community Flood Plan.
Form a new community flood group to take ownership of the Buckingham Flood Plan	Flood Action 4 Buckingham have set up independently. FA4B are actively engaging with multiple agencies and working on an update to the flood plan.
(Updated recommendation) Buckingham Town Council, as landowner of river front through Buckingham, should ensure that it exercises its riparian responsibilities	Buckingham Town Council have advised that it will continue to exercise its riparian responsibilities appropriately. Park checks

appropriately. This should include the establishment of an appropriate riparian maintenance regime.	remain in place on a weekly basis and issues are addressed once flagged.
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Recommendations for Buckinghamshire Council	Actions Taken
Measure success of Upper Great Ouse NFM project and consider feasibility of further NFM interventions	The Upper Great Ouse NFM project is complete and highlighted 5 priority tributary catchments that could provide flood risk reduction benefits to Buckingham if carried out at a catchment scale (Gawcott Brook, Hinton Stream, Radstone Brook, Stowe Brook, and Syresham Stream). We have recently secured funding for an additional scoping study which will look to identify further areas of potential for NFM measures in the Upper River Great Ouse Catchment, however this study will primarily focus on areas downstream of Buckingham and will therefore provide limited benefit to the town. We continue to work with the Upper & Bedford Ouse catchment partnership and the EA to secure external funding for future NFM opportunities which may benefit Buckingham
(Updated recommendation) Buckinghamshire Council, as landowner of large stretches of river front through Buckingham, should ensure that it exercises its riparian responsibilities appropriately. This should include the establishment of an appropriate riparian maintenance regime.	Buckinghamshire Council has undertaken some riparian maintenance through Heartlands Park whilst discussions are in progress within the Council and with the Environment Agency as the regulator of the River Great Ouse in Buckingham in order to develop a suitable maintenance plan.
Buckinghamshire Council Highways to investigate condition of highway network at Hunter St/Nelson St/Tingewick Road junction	CCTV completed. Job raised 866375 to investigate a collapsed gully that was found on the CCTV. This could be the cause of a retaining wall being placed in close proximity and will

	need to be investigated when the teams are on site for a possible green claim. It also could be that this section needs re-routing.
Buckinghamshire Council Highways to review regular inspection to ensure that bridge openings (particularly London Road Bridge) are kept clear of debris	Inspection regime has been reviewed. The area under London Road Bridge is in good condition and has routine inspections at 2 & 6 year intervals

6. Conclusion

The flooding that occurred on 25th November 2024 impacted at least 38 properties in Buckingham internally, including commercial properties. Buckinghamshire Council, as Lead Local Flood Authority, has taken the decision to produce an addendum to the 2020 Section 19 Flood Investigation Report.

Prolonged heavy rainfall falling on an already saturated catchment meant the channel capacity of the River Great Ouse was exceeded. Water spilled out of bank and spread across the floodplain. The same rainfall generated surface water runoff locally, which quickly combined with the River Great Ouse flood waters to overwhelm drainage systems and combined foul sewers causing surface water flooding. Groundwater levels were reported to be high and are likely to have also contributed to the flooding, with reports of water entering properties from underneath floors in several streets.

Multiple organisations responded to the event and followed their own procedures.

Recommendations from the 2020 S19 Investigation Report have been reviewed in conjunction with the relevant RMAs. Updates have been added to both the recommendations themselves and the action taken.