Conceptual Model of Flooding in Hinksey Park Ward, Oxford

Executive Summary

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Flooding in Hinksey Park Ward

Hinksey Park Ward in South Oxford (shown on right) sits on the floodplain of the River Thames, where shallow gravel aquifers and nearby rivers are strongly connected. The area regularly experiences a mix of fluvial (river), and groundwater flooding which can affect homes, gardens, basements, roads and sewer systems.

The *Flooding in Hinksey Park Ward, Oxford* report explores how far existing river monitoring data, together with local experience of significant flooding in the area since 1998, can be used to give people earlier warning of future flooding, particularly when that flooding is caused not only by river levels rising and/or overflowing but also by groundwater rising up from below the surface.



Flooding in Hinksey Park Ward (1)

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It explores why flooding happens in this location, how water moves through the area and what happened during previous flood events. It also highlights information that is still missing to fully understand the risks of future groundwater flooding and how those gaps in knowledge might be addressed. This summary gives an overview of these findings - full details of the data used can be found in the full report.

Hinksey Park Ward is particularly vulnerable to flooding because it sits on the River Thames floodplain and is surrounded by rivers and streams and underlain by permeable sand and gravels. The study identified 13 major flood events since 1998 that caused significant disruption including:

- Flooding of homes and basements
- Flooded roads, including restrictions on the Abingdon Road
- Gardens and outbuildings becoming inundated
- Pressure on sewer and wastewater systems

Flooding in Hinksey Park Ward (2)

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Floods in the area often follow a familiar pattern: a period of intense rainfall leads to a rapid rise in water levels in the Hinksey Stream to the west of Hinksey Park Ward, followed by a slower but sustained rise in the River Thames and Weirs Mill Stream levels rise to the east. As rivers rise, groundwater levels may also rise up through the gravel aquifer beneath the area affecting basements, gardens and low-lying properties.

Groundwater may also flow underground into the sewerage and storm drain networks meaning they do not work properly. Although river and stream levels drop soon after the flood peaks, groundwater takes longer to drain away, leading to extended periods of lingering floodwater.

Analysis of long-term records shows a strong correlation between river levels and groundwater levels in this area. In key locations, groundwater level peaks typically lag behind river level peaks by up to 20 hours, depending on proximity and conditions. In an area of New Hinksey, relatively far from the main rivers, where a borehole has measured groundwater levels for 30 years, the lag is usually around 20 hours, meaning rising river levels give some advanced indication of groundwater flooding.

Main Sources of Flooding (1)

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Flooding is influenced by several upstream river catchments, namely the Upper Thames as well as the Evenlode and Cherwell rivers.

Where and how much rain falls within these catchments affects how quickly rivers rise, how much water is flowing in the rivers over time and whether the flooding comes in single or double peaks. Large, single-day storms, multi-day rainfall or repeated smaller events can all trigger flooding, especially when river levels are already high.

Two Environment Agency gauges (at Iffley Lock on the Thames and Cold Harbour on Hinksey Stream) reliably indicate when flooding in the Hinksey Park Ward is likely to happen. The report also looked at whether more distant upstream stations can provide extra warning time. The best upstream indicators were identified at Shifford Lock, Northmoor Lock and Kings Lock, all on the River Thames.

Main Sources of Flooding (2)

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The report identified that these stations reliably reach certain levels only during flooding that later affects Hinksey Park Ward. These levels are useful to residents of Hinksey Park Ward to help them assess whether flood events that regularly affect them are likely to have a major impact.

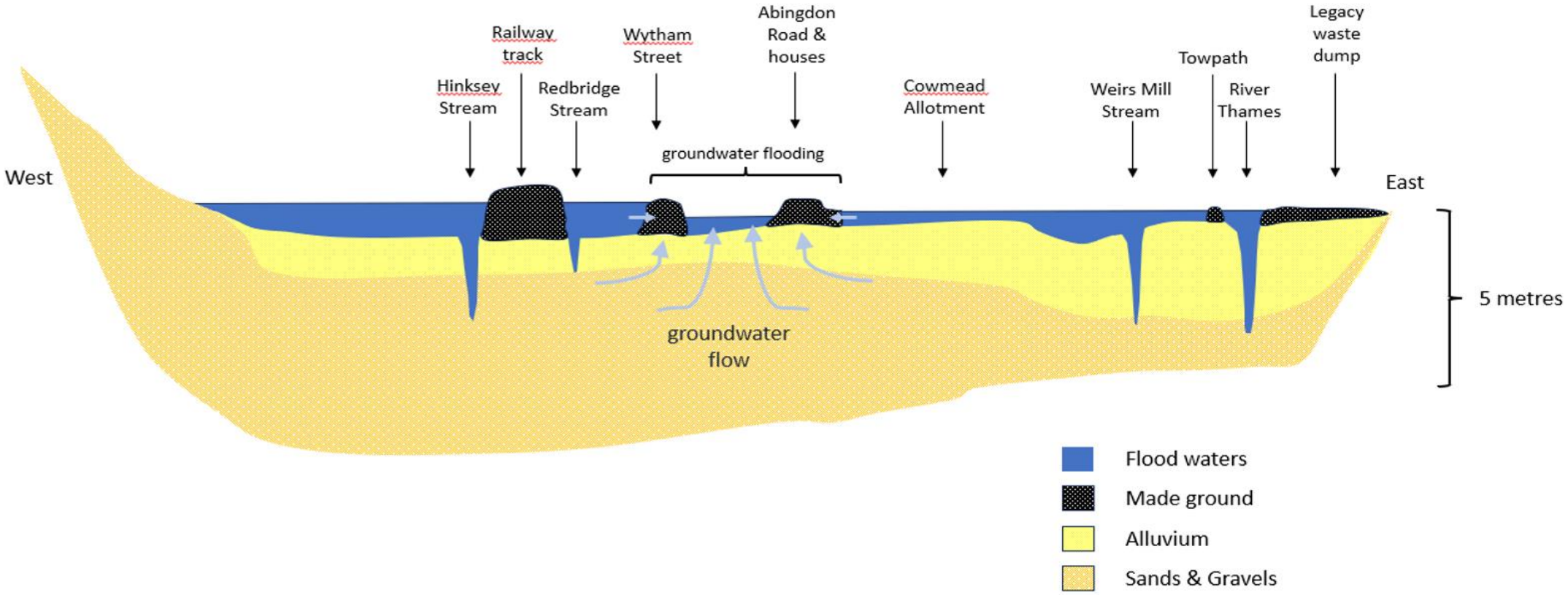
However, the time lag between any upstream rise in water levels and local impact is highly variable. The report concludes that although specific trigger levels at upstream stations can be used for early warning, the warning time is often short and inconsistent.

The Environment Agency flood warning service generally signals all major floods. The report confirms that since 2006, its alerts and warning system has successfully identified the 13 major flooding events reported by residents, which also saw groundwater flooding. However, the time between Environment Agency warnings and actual flooding in Hinksey Park Ward has ranged from a few hours to over a day, reflecting the complexity of local flood behaviour.

Conceptualising flooding at Hinksey Park Ward

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West-east cross-section schematic through Hinksey Park Ward showing typical ground and building elevations, as well as geology and river and groundwater levels during a flood event:



What This Means for Local Residents

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For residents in Hinksey Park Ward, this report concludes that:

- River level data can help predict groundwater flooding, thanks to strong hydraulic connection in the floodplain
- Thresholds for key river stations (local and upstream) may help guide residents on when to take protective action
- Groundwater levels that can cause flooding often lag rises in river levels, meaning residents may still have time to react even once river levels are high
- Groundwater affects sewers and drains during flood events, making impacts greater.

The South Oxford Flood Action Group (SOFLAG), supported by Project Groundwater, has created a website showing live stream, lake, flood and groundwater level data from its own monitoring network, along with the Environment Agency river data. It also provides guidance to interpret these data.

It was launched in early 2026 to help residents assess flood conditions and during the February 2026 flood was supplemented with a daily flood status shared via a community text group.

Recommendations

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To improve and support better flood warning in Hinksey Park Ward the report recommends:

- Developing a better understanding of how floodwaters move through the area
- Improving the monitoring of how water recedes after floods
- Mapping and understanding the role of underground infrastructure such as sewers, drains and utilities
- Assessing the risks from future floods that may be greater than those recorded since 1998
- Improving local groundwater monitoring to refine flood warnings.

The report concludes that whilst predicting the additional from groundwater flooding in Hinksey Park Ward is challenging, developing a better early warning is possible by combining upstream river monitoring, local data and community knowledge.

While a simple warning system is unlikely to work in such a complex environment, an improvement in forecasting could give residents more time to prepare for major floods.

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Project Groundwater supports communities to be more resilient to groundwater flooding.

It is a six-year programme working with communities in up to nine high-risk flood areas of the Chiltern Hills and Berkshire Downs.

It is led by Buckinghamshire Council in partnership with five other local authorities and Flood Community Groups. This project is funded by Defra as part of the £150 million Flood and Coastal Innovation Programmes which is managed by the Environment Agency.

These programmes are driving innovation in flood and coastal resilience and adaptation to a changing climate.