Flood Investigation Report

Storm Henk

2nd January 2024

Glooston

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7 GLOOSTON

Glooston is a rural village in Harborough District, located about 9km north of Market Harborough.

7.1 LOCAL DRAINAGE CONTEXT

The Glooston Arm, an Ordinary Watercourse and tributary of the Stonton Brook, flows south-westerly through the centre of Glooston as illustrated in Figure 7-1. An un-named Ordinary Watercourse discharges into the Glooston Arm to the east of the village north of Cranoe Road at OS national grid reference (OSNGR) SP 75152 95877. Two smaller Ordinary Watercourses converge with the Glooston Arm downstream of the village; at OSNGR SP 74840 95650 and OSNGR SP 74839 95654; one flowing northwards and one flowing southwards respectively, both to the south of St. John the Baptist Church.

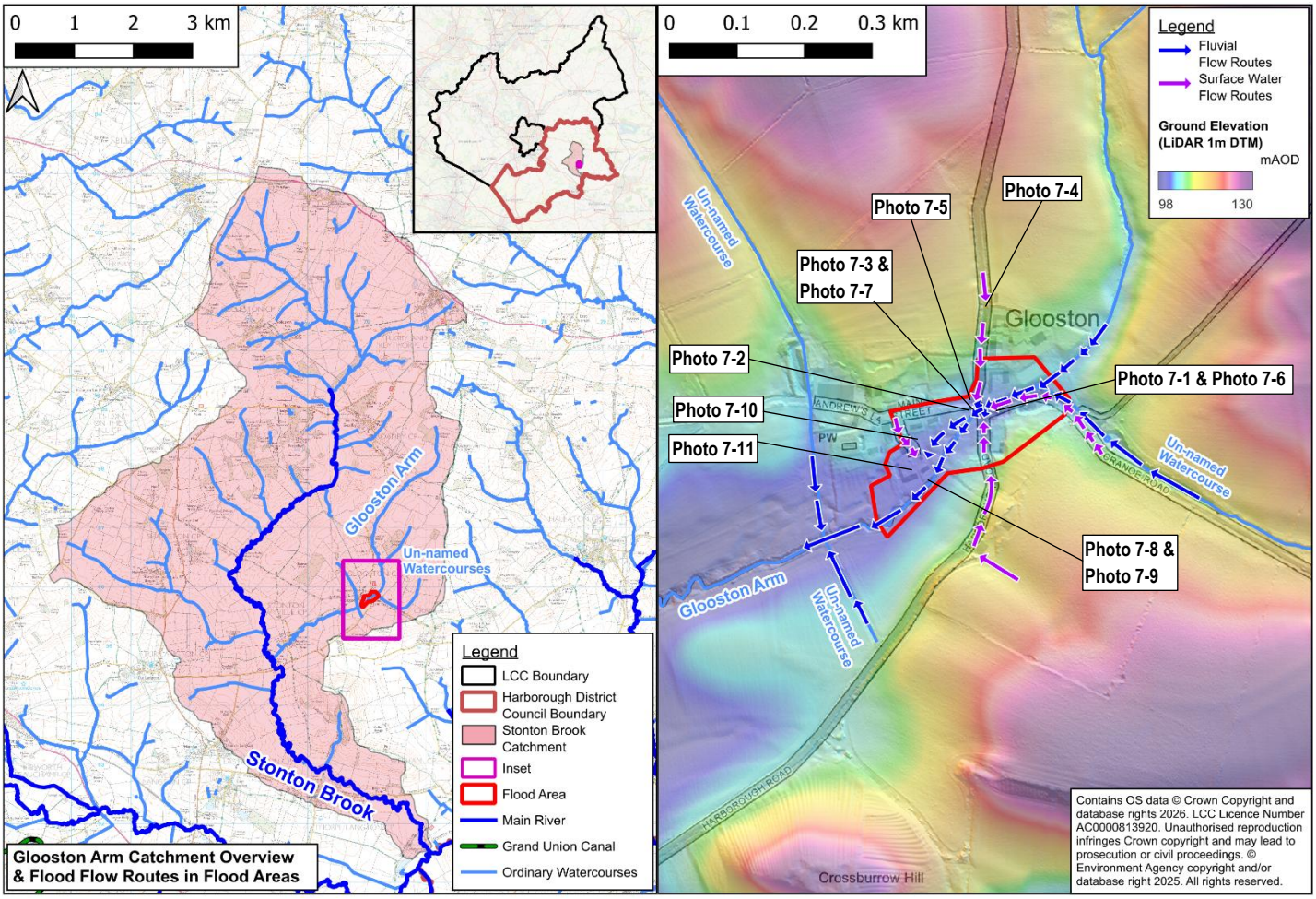
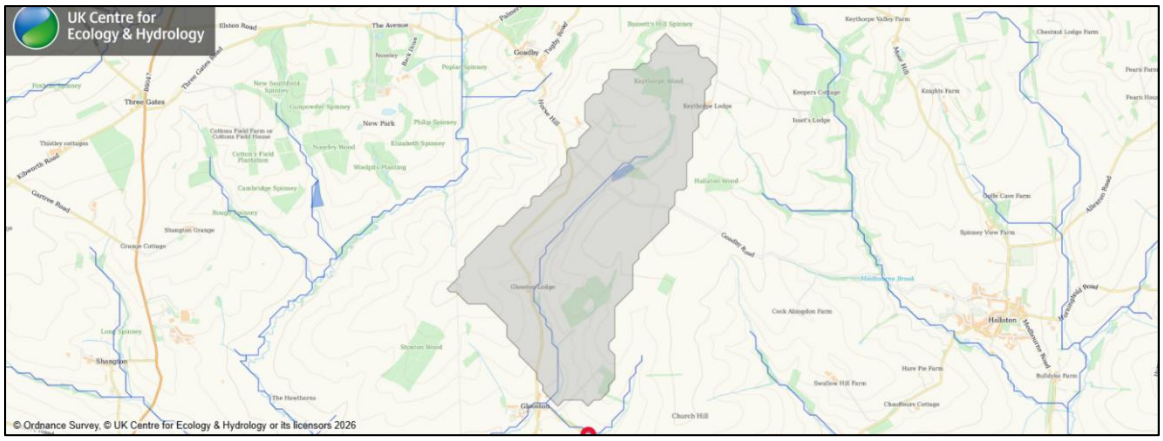


Figure 7-1: Glooston location plan, relevant watercourse catchment and flow routes through Flood Area (INSET 15)

The UKCEH Flood Estimation Handbook Web Service[1] provides strategic level catchment mapping as illustrated in Figure 7-2. The upstream catchment comprises of predominantly agricultural use and has a contributing area of approximately 4.3km^2. The Glooston Arm has two main sub-catchments which converge at Cranoe Road, 80m east of the village centre. The watercourse then runs adjacent to Cranoe Road, before passing under Harborough Road through a bridge culvert (see Photograph 7-1 and Photograph 7-2).

1.



2.

Figure 7-2: FEH Catchments for Glooston Arm (1) and un-named Ordinary Watercourse at Harborough Road bridge (2), Glooston

Ground elevations along Goadby Road, Cranoe Road and Harborough Road descend towards the village (Figure 7-2). The surrounding hillside topography is relatively steep, leading to rapid surface water runoff though the network of drainage ditches and Ordinary Watercourses. The valley floor is narrow (v-shaped), resulting in a concentration of flows through the centre of the village.

There is a public foul sewer network (Anglian Water), but no mapped surface water or combined network.

There is a small amount of traditional public highway drainage infrastructure within Glooston or on the roads that drain towards the village which discharge directly to the Glooston Arm. Mostly, where roadside ditches are present, including alongside Goadby Road, surface water is removed from the highway via grips which channel water into the ditches.

[1] UK Centre for Ecology & Hydrology (2026) FEH Web Service https://fehweb.ceh.ac.uk/Map

7.1.1 GEOLOGY

The BGS online mapping[2] indicates that the catchment upstream of Glooston is dominated by superficial deposits of Oadby Till Member. Till is often referred to as boulder clay and it is characterised by poor permeability and low infiltration rates. During prolonged wet periods, soils of this nature can become quickly saturated, resulting in rapid rates of surface water runoff.

7.1.2 NATIONAL SCALE PREDICTIVE FLOOD MAPPING

The EA provides flood risk mapping nationally for both rivers and surface water as detailed within Section 2.7.6 of the main Storm Henk report. The extents of EA Flood Map for Planning (NaFRA2) Flood Zones 2 and 3 associated with the watercourses through the village (medium and high risk of river flooding respectively) are illustrated in Figure 7-3. These largely follow close to the river corridor of the Glooston Arm until the valley begins to widen and flatten downstream of its confluence with the Ordinary Watercourse tributary.

Areas of the village are also identified as being at a high, medium and low risks of flooding in the national EA Risk of Flooding from Surface Water (RoFSW) (NaFRA2) are illustrated in Figure 7-3. This illustrates a wider flood envelope along the tributary watercourse upstream of Cranoe Road, and near the confluence of the Glooston Arm with its northern tributary downstream of the St. John The Baptist Church.

This risk however can be exacerbated by localised ground elevation detail or drainage infrastructure limitations, which are not always represented within the strategic level RoFSW mapping.

7.1.3 FLOOD HISTORY

There are no recorded previous significant watercourse flood events for Glooston village as a result of the Glooston Arm.

7.1.4 HYDROMETRY

There are no known river flow gauges on the relevant watercourses within this catchment area.

7.1.5 FLOOD WARNINGS

There are no EA Flood Warning Areas along the Glooston Arm or covering the Glooston Flood Area, specifically as they are not within any flood extents of any Main Rivers for which the EA are responsible. Glooston does however benefit from EA Flood Alerts which are associated with the fluvial flood risk along the Glooston Arm corridor.

[2] British Geological Survey (2026) BGS Geology Viewer. https://geologyviewer.bgs.ac.uk/

Photograph 7-1: Glooston Arm at the Harborough Road bridge culvert inlet looking downstream from Cranoe Road3

Photograph 7-2: Glooston Arm at the Harborough Road bridge culvert outlet looking upstream from Main Street3

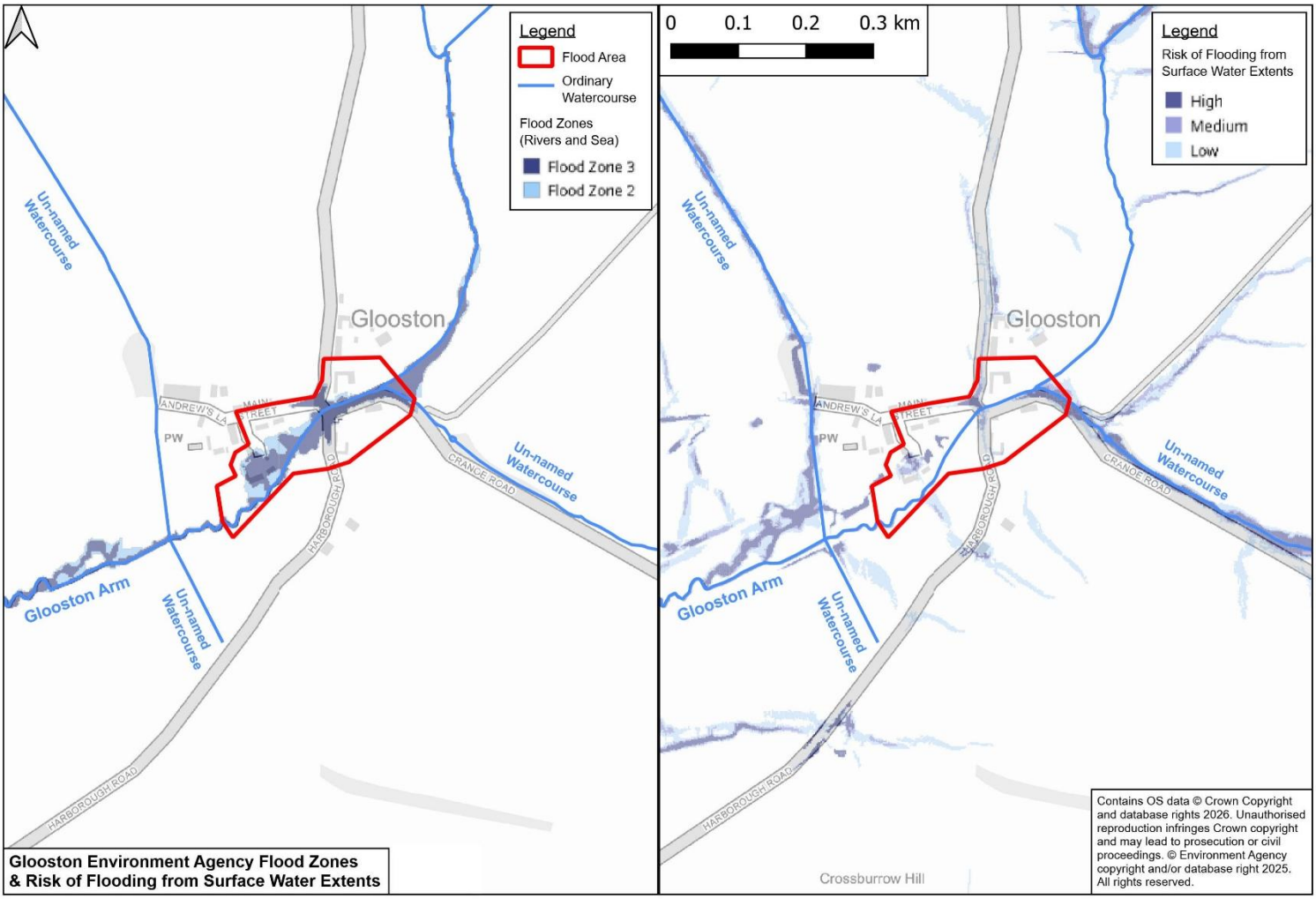


Figure 7-3: Glooston EA Flood Map for Planning Flood Zones[4] and Risk of Flooding from Surface Water Extents[5] in Flood Area (INSET 15)

[3] FPS Environmental (2024) Glooston Village – Flood Investigation Site Visit Report
[4] Environment Agency (2026) Risk of Flooding from Surface Water map. https://check-long-term-flood-risk.service.gov.uk/map

7.2 WHAT HAPPENED AND WHY?

WHO OR WHAT WAS AFFECTED?

5 properties reported as internally flooded

At least 1 property reported as externally flooded

From 09:00 hours on Tuesday 2nd January 2024, heavy rain began falling on the already saturated catchment. Flooding to properties is reported to have occurred from around 15:00 hours and was reported to have appeared and disappeared very quickly.

7.2.1 UPSTREAM OF HARBOROUGH ROAD BRIDGE CULVERT

Surface water flowed off the fields in the surrounding agricultural catchment which exceeded the capacity of land drain ditches and tipped onto Goadby Road, Cranoe Road and Harborough Road. The capacity of drainage ditches running alongside these roads was also exceeded by the volumes of surface water runoff. These roads therefore acted as conduits for the flood water which headed towards the Harborough Road bridge as shown in Photograph 7-3. Properties along Goadby Road reported internal flood depths of approximately 350mm.

Out of bank flow, which had exceeded the capacity of the Glooston Arm channel and overtopped the bank thresholds, also progressed westwards down Cranoe Road towards the same location as shown on Photograph 7-4 and Photograph 7-5.

Photograph 7-3: Surface water flowing down Goadby Road towards Glooston village centre

The Harborough Road bridge culvert itself, conveying the Glooston Arm, was observed during the flood event to be flowing at full capacity. The downstream extent of the bridge culvert was also observed to be significantly silted after the flood event (Photograph 7-7). A proportion of this may have been mobilised within the catchment, transported into the watercourse channel and deposited during the flood event as flow speed reduced. Leicestershire County Council (LCC), the Local Highways Authority (LHA), were not aware of any obstructions prior to the flood event.

Historically, the bridge culvert was installed to replace an arched-bridge, and the south river bank (on the northern side of Cranoe Road) on approach to the bridge culvert was reinforced. A wall was installed with rip-rap (large rocks) (Photograph 7-6) to prevent erosion of the earth embankment that was exhibiting deterioration.

Photograph 7-4: View from Cranoe Road of Harborough Road bridge deck flooded looking downstream

Photograph 7-5: Flooding at junction of Main Street and Goadby Road[3]

Photograph 7-6: Bank reinforcement upstream of Harborough Road Bridge looking eastwards towards Cranoe Road

Photograph 7-7: Silt deposition within the Glooston Arm on outlet of the Harborough Road Bridge culvert looking downstream following the flood event[3]

After the flood event, a site inspection in February 2024 identified minor vegetation and litter debris obstructions in the Glooston Arm channel exacerbated by tree roots on the bank sides (Photograph 7-8) and boundary fences that crossed the channel (Photograph 7-9). These likely reduced the channel conveyance capacity, locally raised water levels and re-routed flows in the immediate vicinity before they bypassed the obstruction and returned to the channel. These restrictions were not considered to be the primary cause of the flooding as the volume of runoff significantly exceeded the capacity of the drainage system. It is likely however that they exacerbated flooding close to their immediate location.

Photograph 7-8: Vegetation debris within Glooston Arm channel[3]

Photograph 7-9: Vegetation debris within Glooston Arm channel[3]

Culvert outfalls into the Glooston Arm were reportedly submerged due to the high water levels within the channel. This prevented connecting highway drainage (several gullies on Main Street and Goadby Road) from working effectively as the network storage and conveyance capacity of the channel became overwhelmed.

Due to the amount of rainfall and the magnitude of the flood event, it is highly unlikely that fully functional highway grips or gullies would have prevented the flooding from having occurred during Storm Henk. Whilst the grips may have removed water more effectively from the highway, this volume of water would still have had to pass through the bridge culvert under Harborough Road that was already flowing at full capacity. It is understood that the conveyance capacity of the highway bridge culvert became exceeded during the event.

Typically, road drainage networks are designed to accommodate limited rainfall events on the contributing area of highway itself and not for any additional volumes of overland flow originating from land adjacent to the highways or when watercourses have overtopped.

The combination of overland flow and surface water ponding reportedly flooded three nearby residential properties internally as water depths exceeded the thresholds entering via the front off Cranoe Road.

7.2.2 DOWNSTREAM OF HARBOROUGH ROAD BRIDGE CULVERT

Just downstream of the Harborough Road bridge culvert, video footage taken during the Storm Henk event shows the flows from the Glooston Arm coming out of bank and flowing across a paddock, as depicted in Photograph 7-10. The fluvial flows appeared to be following a historic brook channel (paleochannel). The brook in this location appears to have been straightened when compared with other meandering sections nearby, and the historic channel is visible on LiDAR.

The volume of flood water was so significant that it submerged the southern extent of Bluebell Lane. These flow routes are consistent with the EA Flood Map and RoFSW map. These flows in combination with overland surface water flowing southwards down Bluebell Lane reportedly caused internal flooding to a further two properties after flooding exceeded the thresholds, and external flooding to one before flowing back into the Glooston Arm channel. One of the gardens that flooded along Bluebell Lane is depicted in Photograph 7-11.

Photograph 7-10: Flooding of the Glooston Arm as overland flow across the paddock viewed from Bluebell Lane

Photograph 7-11: Garden flooding along Bluebell Lane

7.3 WHAT HAS BEEN DONE?

A summary table of the actions undertaken by the relevant RMAs across Leicestershire is provided in Section 2.7 of the main Storm Henk report. A summary table of actions and any relevant next steps specific to Glooston is provided in Section 7.4.

Whilst the actions from this investigation will help to reduce flood risk, communities should also take steps to be prepared for future flooding, especially with climate change increasing the risk of occurrence. More information can be found in Section 21.8 of the main Storm Henk report.

7.4 GLOOSTON ACTIONS

The following actions will be monitored by LCC, as Lead Local Flood Authority (LLFA), through their local coordination role. This action plan is live and will be subject to change as actions are progressed.

Actions taken during and in the immediate aftermaths of the event, such as the closure of roads and set-up of rest centres are not detailed. Further details on RMAs and their roles, and how they work in partnership, can be found in the Leicestershire Local Flood Risk Management Strategy[6].

7.4.1 SHORT-TERM ACTIONS (0 - 6 MONTHS)

ACTION	ACTION DETAIL	LEAD RMA	CURRENT STATUS
Property Flood Recovery Grant Scheme Support	Assist residents to apply for and install Property Flood Resilience (PFR) measures under the Property Flood Recovery Grant Scheme, which launched in April 2024.	LCC LLFA	Complete - 2 homeowners successfully applied for the grant in Glooston.

7.4.2 MEDIUM-TERM ACTIONS (6 - 12 MONTHS)

ACTION	ACTION DETAIL	LEAD RMA	CURRENT STATUS
Highway Drainage Improvements	Install more grips on Goadby Road, Cranoe Road and Harborough Road to improve the efficiency of water removal from the highway during more frequent rainfall events.	LCC LHA	Complete – 23rd September 2024 under job reference 666254: • Goadby Road – 4 grips north of 20th Godby Road

[6] Leicestershire County Council (2024) Leicestershire Local Flood Risk Management Strategy - https://www.leicestershire.gov.uk/environment-and-planning/flooding-and-drainage/lead-local-flood-authority/flood-risk-management

ACTION	ACTION DETAIL	LEAD RMA	CURRENT STATUS
			• Cranoe Road – grips opposite Brookside Cottages and 3 more along approach into village. Main Street – 2 grips opposite Home Farm and concrete grip by finger post.
Riparian landowner engagement	Liaise with the riparian landowner of the channel immediately downstream of the culvert which runs under Harborough Road. Ensure any obstructions are removed to allow the culvert to convey its full design capacity.	LCC LLFA	Complete

7.4.3 LONG-TERM ACTION (12 MONTHS +)

ACTION	ACTION DETAIL	LEAD RMA	CURRENT STATUS
Riparian landowner engagement	Inspect ditches adjacent to the highway with the respective landowners reminding them of their riparian responsibilities, to ensure that they are adequately maintained.	LCC LLFA	Ongoing
Ordinary Watercourse Conveyance Improvement Works	Ongoing engagement with riparian landowners to ensure proactive future maintenance to remove obstructions that may impede flows within the channel.	LCC LLFA	Complete

ACTION	ACTION DETAIL	LEAD RMA	CURRENT STATUS
Natural Flood Management	Support with the community led opportunity for Natural Flood Management (NFM) measures in the upper catchments surrounding Glooston.	LCC LLFA, EA	Detailed design complete Consent application has been approved by LCC LLFA.
Flood Bund	Support with community-led proposals for a bund within the paddock area.	LCC LLFA	Ongoing