

Brough

Infiltration Reduction Plan

Last Updated: March 2025



Executive summary

Brough in Cumbria is currently in the intervention stage (see Figure 1) to address infiltration and reduce spills at the Brough Wastewater Treatment Works Storm Overflow (017670004SO). A desktop assessment concluded that significant groundwater infiltration that would reduce spill count if addressed was possible. CCTV surveys confirmed the presence of infiltration. Interventions to address this are underway and due to be completed in Spring / Summer 2025.

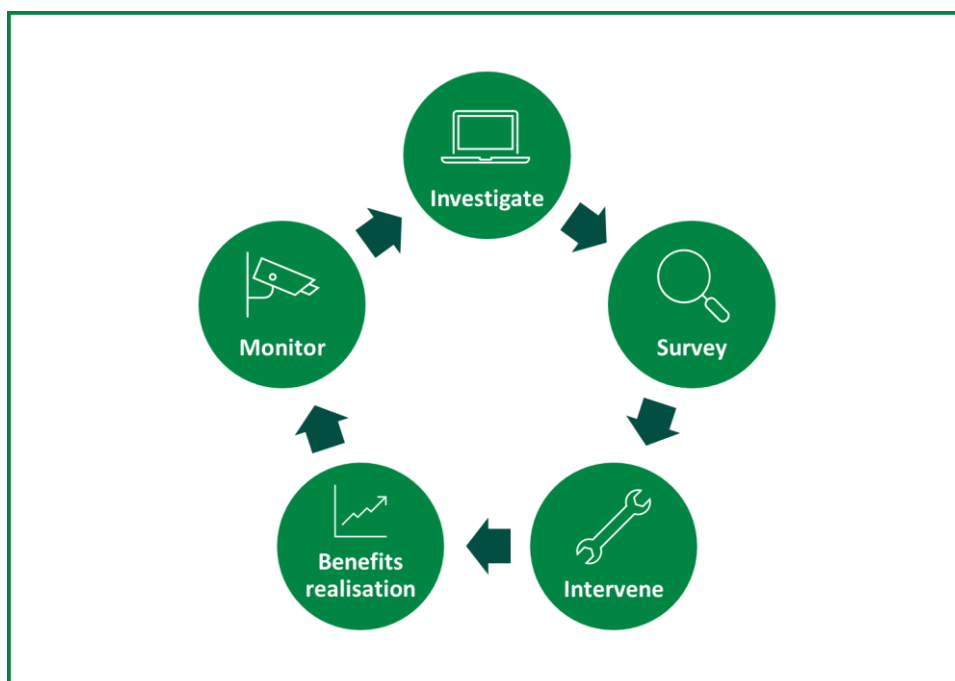


Figure 1: Iterative process to investigate, identify and address groundwater infiltration

Context

Sometimes, water can enter our wastewater pipes that they were not designed to receive. One source of these additional flows can be groundwater infiltration which can occur through pipe defects, leaky joints or issues with manholes. Extra water in the network can cause the sewer capacity to be exceeded, leading to sewer flooding or contributing to storm overflow activations.

As part of our ongoing work to maintain an effective network and achieve Better Rivers for the Northwest, our Infiltration Reduction Plans demonstrate our efforts to date and next steps to address infiltration and inflows in the catchment. This plan covers the Brough drainage area and the associated overflow, Brough Wastewater Treatment Works Storm Overflow (017670004SO). In 2022, infiltration was identified as a potential leading cause of the storm overflow discharging. The purpose of this plan is to capture the process to investigate, identify and address significant groundwater infiltration.

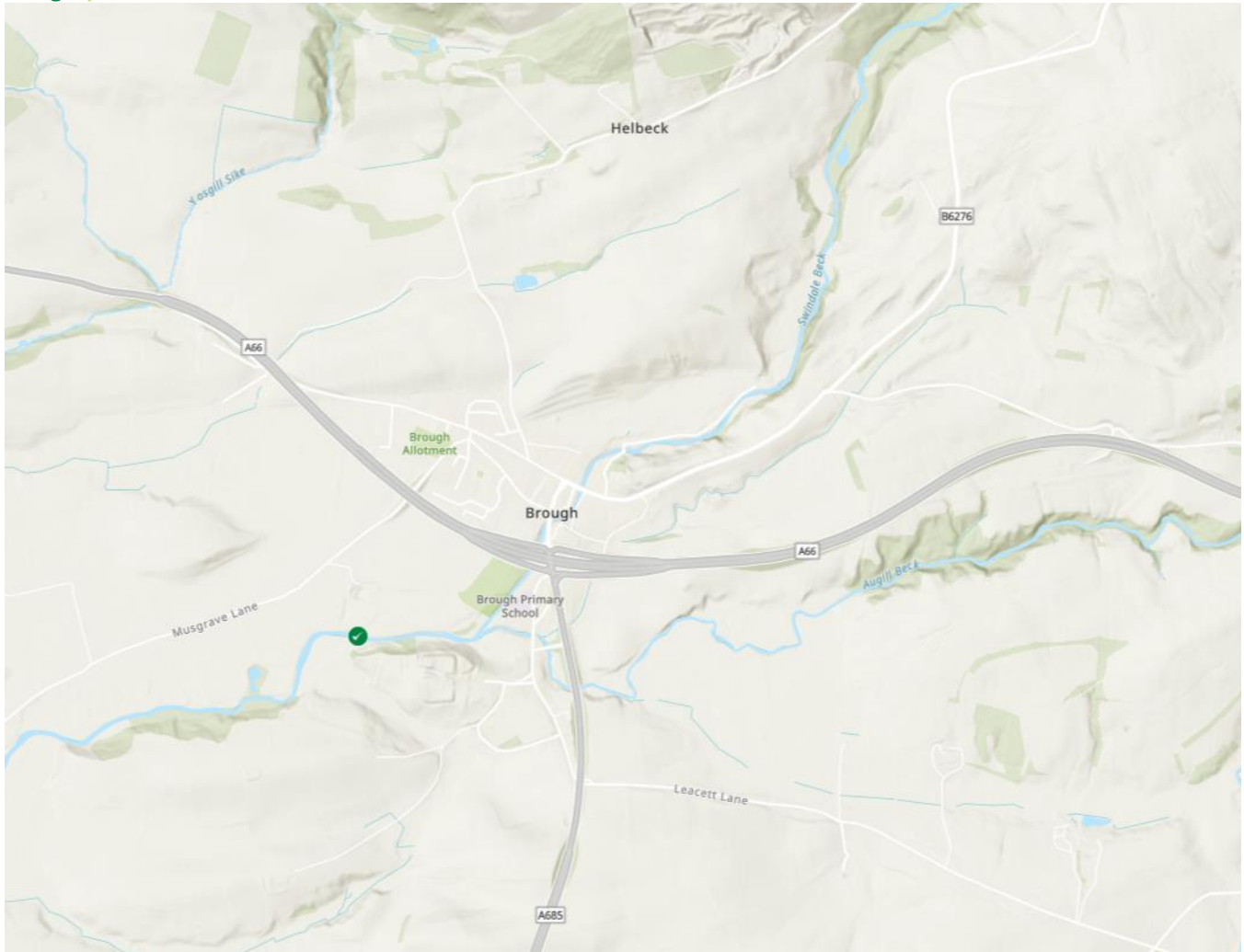


Figure 2: United Utilities – Better Rivers – Storm Overflow Map (September 2024). The green dot marks the Brough WwTW Storm Overflow.

Brough is a small town in the Eden Valley, Cumbria. Swindale Beck, a tributary of the River Eden runs through the town. It sits to the west of the Pennines but has a relatively flat topography.

Investigate

A desktop study was undertaken using available data to understand the extent of infiltration in the sewer network of the drainage catchment. The following data (where available) was analysed to determine the scale and location of potential infiltration:

- Relevant flow and depth data
- Operational information
- MCERTS data
- Hydraulic models of the catchment
- River levels
- Groundwater (borehole) data
- Spill analysis
- Topographical and sewer maps

The assessment concluded that significant groundwater infiltration was possible in the catchment. There was evidence of an elevated baseflow, possibly because of seasonally varying groundwater levels. As well as this, any reduction in baseflow at Brough was identified as being sufficient to reduce spills.

Further observations also identified areas where the sewers cross the river. It can be that flow from these rivers can enter the sewer system via cracks in the sewer system or when there is a rise in water level.

From these findings, it was recommended that CCTV surveys were completed to see if there is infiltration of the water course into the sewer. CCTV surveys also identify if there is land drainage connected into the sewer which, if found, would then be assessed for removal.

Survey

As recommended, we completed 815m of CCTV surveys in Winter 2024 and identified infiltration. The CCTV surveys were reviewed by an engineer and assessed using Artificial Intelligence to rapidly identify and locate points of infiltration requiring remedial works. Heavy gushing and running infiltration were found in 2 of the 40 lengths that were surveyed and 1 of the 40 manholes inspected.

Intervention

Interventions were prioritised to address the points of infiltration and are underway. Interventions include, but are not limited to:

- 5m of sewer lined
- 2 manholes replaced due to point infiltration found and leaking identified in chamber walls.
- Tophat installations - A tophat is a specialist type of liner to seal a junction or connection where there may be wear and tear or defects allowing infiltration.

Next Steps

When remedial works are complete, Brough will enter the benefits realisation stage of identifying and addressing infiltration (see Figure 1). The site will follow an iterative intervention regime to monitor the efficacy of the solution and any related reduction in spills at the associated overflow.