

Plumbland

Infiltration Reduction Plan

Last Updated: November 2024



Executive summary

Plumbland is currently in between the survey and intervention stages (see Figure 1) to address infiltration and reduce spills at the Plumbland Wastewater Treatment Works Storm Tank Overflow (017570072ST). A desktop assessment concluded that there is the possibility of groundwater infiltration and CCTV surveys have confirmed this. Additional surveys are underway to clarify this as well as the exploration of Natural Flood Management to manage rural run off if this is found to be a significant contributing factor in spill numbers.

As groundwater infiltration has been identified work is under way to confirm if it is a leading cause of spills, interventions will be assessed and this Infiltration Reduction Plan will be updated accordingly. If not, this plan will end at the survey stage and next steps will be processed through other relevant workstreams.

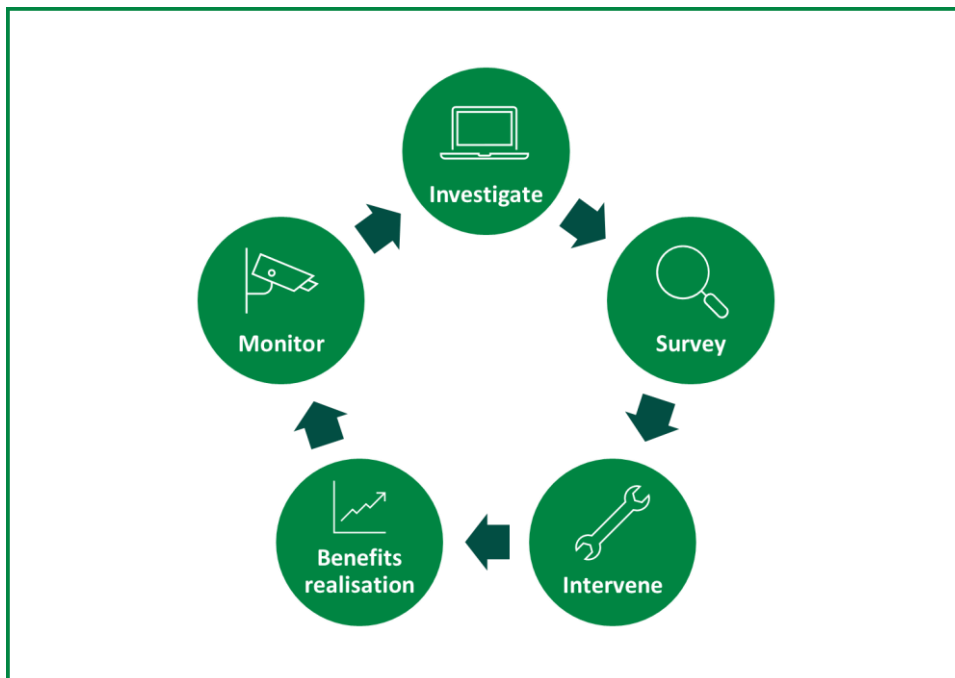


Figure 1: Iterative process to investigate, identify and address groundwater infiltration

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 North West, our Infiltration Reduction Plans demonstrate our efforts to date and next steps to address infiltration and inflows in the catchment. This plan covers the Plumbland drainage area and the associated overflow, Plumbland Wastewater Treatment Works Storm Tank Overflow (017570072ST). In 2022, infiltration was identified as a potential leading cause of the storm overflow discharging. The purpose of this plan is to further investigate and address this. If groundwater infiltration is found to be a leading cause of spills, interventions will be assessed, and this Infiltration Reduction Plan will be updated accordingly. If not, this plan will end at the survey stage and next steps will be processed through other relevant workstreams.

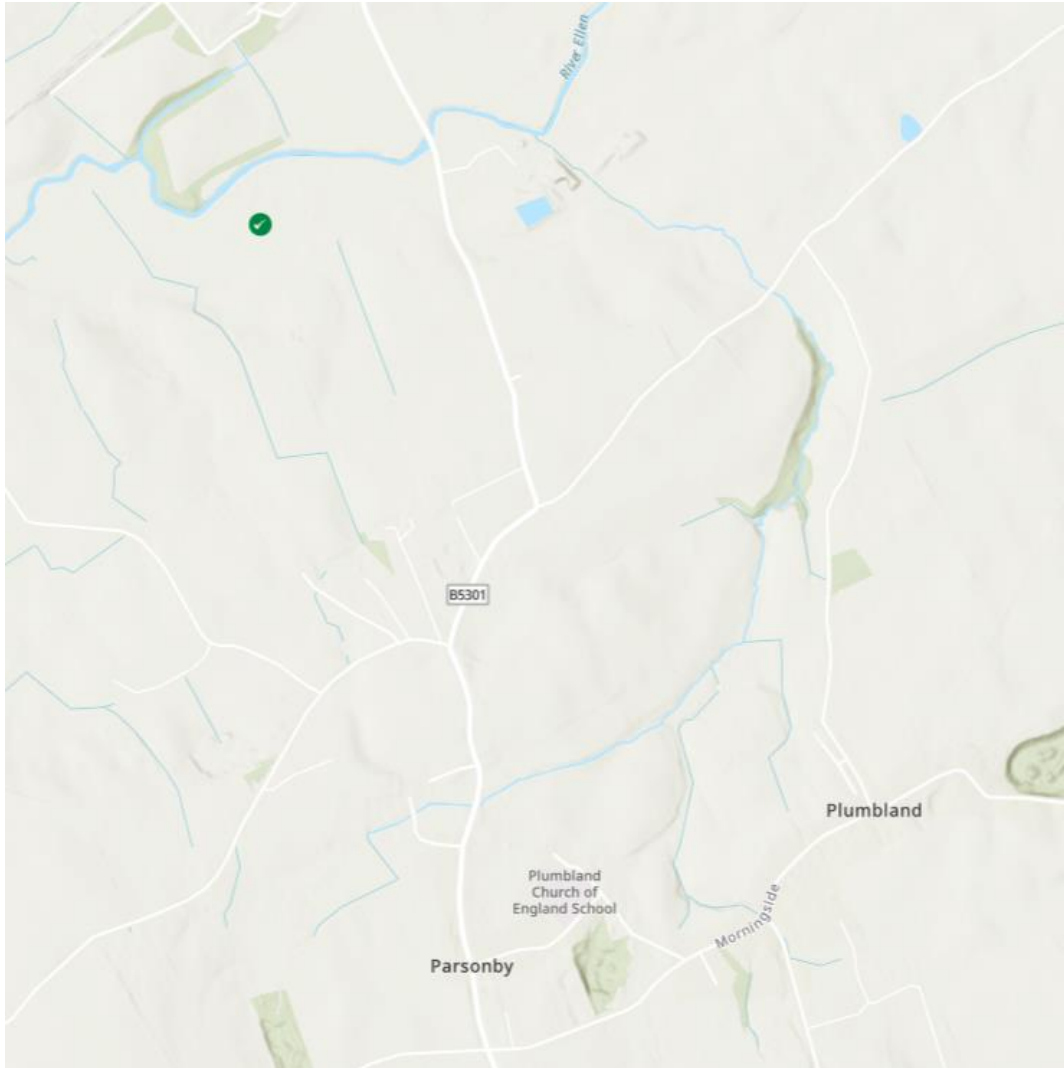


Figure 2: [United Utilities – Better Rivers – Storm Overflow Map](#) (November 2024). The green tick marks the Plumbland Wastewater Treatment Works Storm Tank Overflow.

Located in the Cumberland district of Cumbria, Plumbland is a small village sitting just over 2km north of the border of the Lake District National Park. It is a rural village surrounded by fields, farmland, and hills. The River Ellen and its tributary Flatts Beck lie North of Plumbland village.

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. Whilst there was little evidence of 'base' infiltration in the system, monitoring at the storm tank indicated rainfall induced infiltration as well as some level of groundwater infiltration due to seasonal high groundwater levels.

Further observations identified areas of the catchment where sewers cross local rivers and streams and rural streams and ditches run down steep banks towards the highway where there are public sewers. It is possible that flow from these streams could enter the sewer system via highway gullies, land drainage systems, or defects in the network.

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

Survey

Surveys for other works in Spring 2024 have already revealed some points of infiltration in Plumbland. Additional comprehensive CCTV surveying of the area is planned for Winter 2024 to identify further infiltration and inflows to the sewer. This may be extended to Winter 2025 if surveying is not conclusive. The CCTV survey information will then be assessed using Artificial Intelligence to identify outstanding infiltration and inflow issues that need addressing.

As well as CCTV, surface water modelling software will be used to complete a hydrological and topographical assessment to identify opportunities for natural flood management in the catchment to reduce the impact of rural runoff on sewer capacity.

Next steps

Plumbland is currently in between the surveying and intervention stages of identifying and addressing infiltration (see Figure 1). Remedial works at the identified points of infiltration are in progress as well as additional CCTV surveys to confirm all infiltration and inflows in the drainage area.

If the additional CCTV survey reveals groundwater infiltration, further interventions will be considered. The site will follow an iterative intervention regime to monitor the efficacy of the solutions implemented. Remedial works at Plumbland have included lining and could extend to relaying sewers, lining sewers or sealing manholes. This would be expected to be completed in 2025.