

KIRKLAND, WASH

ROOT INFILTRATION & FLOODING MITIGATION

The property manager at this site identified continual ponding indicating drainage failure related to the stormwater system. AQUALIS was called to identify the root cause of the flooding and repair the failure.

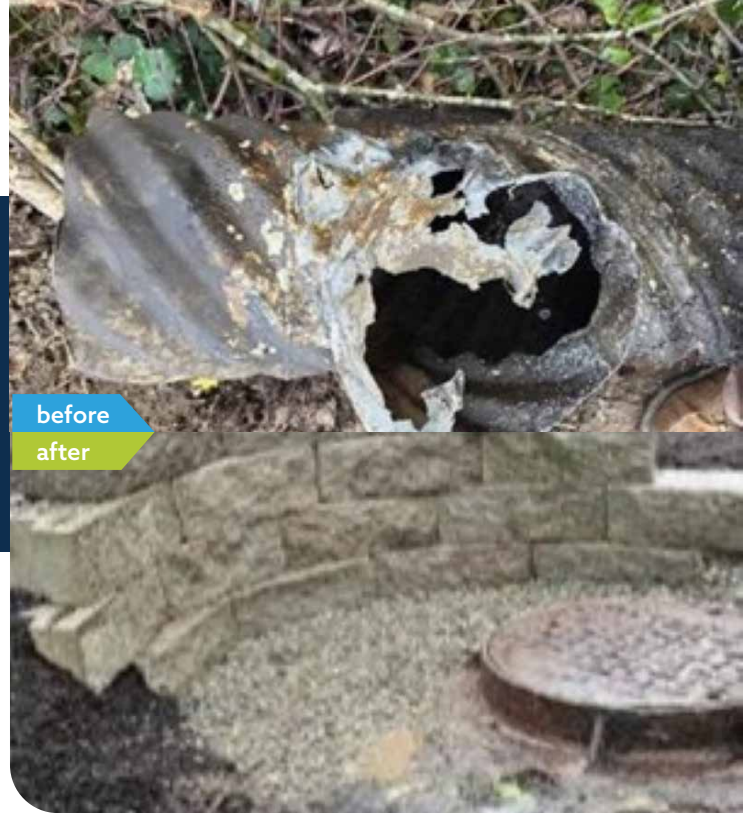
PROBLEM

A property management company in Washington state contacted AQUALIS after noticing water flow issues leading to ponding at one of their apartment complexes. Upon initial inspection, AQUALIS identified problems indicating the stormwater pipeline underground would require repair. If left unresolved, these issues could have led to tenant complaints and safety concerns, property damage and potential violations of local stormwater regulations. AQUALIS promptly dispatched a team to assess the situation and develop a solution.

Due to the location and nature of the property, AQUALIS utilized the local utility location company to identify underground utilities. During this search, a buried manhole cover was located under approximately two feet of soil. Buried manholes restrict access to the pipe and indicate significant soil disruption. After excavating and clearing the area, the team began inspecting the pipeline, starting with the upstream section. They used CCTV (Closed-Circuit Television) to assess the pipe's condition. This method allowed the team to view internal pipe damage with minimal disruption to the surrounding area. During the inspection, they identified extensive damage caused by invasive tree roots and corrosion. Roots had penetrated the pipe, creating an opening for water to flow in or out of the pipe freely, disrupting proper water flow. Root intrusion is one of the most common reasons for pipe failure. As trees and bushes grow, their root systems expand underground compromising infrastructure like this stormwater pipe.

Once the buried manhole was excavated and the area was regraded, the downstream pipe could then be evaluated. Upon this inspection, additional damage was found, confirming the need for a more comprehensive repair. During the inspection process, the team also uncovered that the flow control device inside the stormwater vault was significantly deteriorated and no longer functioning as intended. Flow control devices are often installed inside stormwater vaults to function as a capacity valve that can be manually overridden. Normally, the control device allows the approved amount of stormwater overflow but in extreme circumstances can allow for the vault to be emptied or filled further.

Before proceeding with any repairs, AQUALIS provided a detailed update to the property management company, outlining the extensive damage that was found and the necessary next steps. With the client's approval, the team moved forward with a repair plan to restore proper function and ensure long-term compliance with municipal stormwater requirements.





SOLUTIONS

Before beginning the repair work, AQUALIS mobilized all necessary equipment to the site and installed appropriate temporary Best Management Practices (BMPs), barricades and signage. This ensured that all key components of the project were clearly marked and safely managed.

The team began with the upstream pipe, cutting and excavating the identified areas of pipeline failure. Due to the extensive damage to the pipe, non-invasive repairs were not feasible, and the pipe had to be replaced using traditional trenching methods. Excavated soil was placed on a designated pad to be reused later during backfilling, to eliminate sediment runoff. Once daylighted, the damaged pipe sections were carefully removed and disposed of at an approved off-site facility.

The team determined that the best resolution was to replace all damaged sections of Corrugated Metal Pipe (CMP) with new Polyvinyl Chloride (PVC) pipe. PVC was chosen as it is thicker than CMP and therefore more resistant to root intrusion and as it is plastic; it is less likely to corrode in the conditions of this property.

Once the pipe was installed, the team checked the subgrade to ensure it had the correct slope to support proper water flow. This step is critical in preventing future issues such as blockages and sediment buildup.

After verifying the slope of the new pipe was to original specifications, the connection to the original pipe was reinforced and armored with concrete. The new pipe was then bedded in gravel, and the trench was backfilled using the original excavated soil.

Moving on to the downstream pipe repair, approximately 20 feet of damaged CMP was removed and replaced with new PVC pipe. The pipe was then connected and bedded in a similar manner to the upstream section. The trench was backfilled using the previously excavated soil.

The area around the manhole was leveled, and a small retaining wall was constructed to help prevent future soil buildup from covering the manhole and making it difficult to locate.

As previously mentioned, AQUALIS identified a damaged flow control structure. A flow control structure is a critical component of a stormwater management system. Its main purpose is to regulate the rate at which water flows through a system. The newly installed downstream PVC pipe was intentionally left long to accommodate the improved flow control device.

AQUALIS' team carefully disassembled the original flow control unit, ensuring all parts were removed without causing further damage. The structure was cleaned and examined more thoroughly to determine whether repairs were feasible or a full replacement was necessary.

Upon inspection, it was determined that the Valve needed to be replaced, as the extent of the damage rendered it neither salvageable nor functional. The structure was retrofitted with new parts to enhance overall performance and reliability. Once the necessary components were installed, the control structure was reassembled with care, ensuring everything was properly aligned and securely fastened.

Before final installation, the interior of the flow control vault was inspected. The new flow control device was then lowered into place and installed onto the pipe. After installation, a thorough final inspection was performed to confirm that the system was fully operational and met all quality and compliance standards. The original parking lot ponding issue was successfully resolved and will no longer pose a problem for residents or property managers. General site cleanup was completed, with all debris and waste properly disposed of. Before the project could be complete, the site was restored to its original condition, and the designed stormwater management functionality was fully restored — all with no environmental impact from the repair process.