



Protecting Water Quality Has Positive Trickle-Down Effect

They say we all live downstream from someone and upstream from someone else — a reminder, quite literal for the water industry, of our interconnectedness and responsibility to others. In New York, the Army Corps of Engineers proved how relatively small infrastructure improvements can have outsized impact.

By JoAnne Castagna, EdD

A team of engineers is gathered on a long, empty country road in the Town of Harpersfield, NY. All that's heard is the steady drum of rain on their umbrellas.

They're looking over a new culvert — a large pipe — they constructed that runs under Odell Lake Road and transports Lake Brook from one side of the road to the other. The rain, which has been going on for days, is a nuisance, but it is welcomed by the team from the U.S. Army Corps of Engineers because it's proving that the culvert is successfully performing its job.

If it were weeks earlier, the road would have been flooded because the previous culvert was damaged.

But the success of this project has much bigger implications. By controlling flooding, the culvert is also improving the water quality of the brook for aquatic life and New York City's water supply.

A Critical Culvert

After Lake Brook travels through the culvert, it eventually flows into the West Branch Delaware River, which eventually streams into the Cannonsville Reservoir in Delaware County, NY. This reservoir supplies almost 97 billion gallons of water to the New York City water system. (See sidebar on New York City Watershed System.) A damaged culvert can jeopardize the quality of this water.

The previous undersized culvert was damaged because of years of stormwater impacts. During storm events, high water from Lake Brook plugged the small culvert, triggering overflow and flooding.

When this happens, it can cause stormwater runoff. This is when water from the road sweeps up contaminants and transports them to bodies of water, such as brooks, adversely affecting the water.

Stormwater runoff can also damage roads and accelerate stream-bank erosion. When stream banks are eroded, it makes it easier for soil and pollutants to travel from roads into bodies of water. This pollution can have a damaging effect on the stream's health and the quality of the water that eventually makes its way to the water supply.

A new culvert was constructed and the culvert's stream bank was restored as part of the Army Corps' New York City Watershed Environmental Assistance Program.

"This program funds projects that are protecting the water quality of New York State's watersheds that provide drinking water to millions of New York City residents and businesses," said Rifar Salim, project manager, U.S. Army Corps of Engineers, New York District.

To perform this work, several agencies collaborated with the Army Corps, including the Delaware County Soil and Watershed Conservation District, New York State Department of Environmental Conservation, New York City Department of Environmental Protection, and the Town of Harpersfield.

The new culvert is larger, allowing a greater amount of water to flow through and reduce the chances of flooding during storm events.

"The previous culvert was two circular pipes with a total diameter of 36 inches," said Graydon Dutcher, stream program

New York City Watershed System

The New York City watershed region encompasses approximately 2,000 square miles of land north of New York City.

The land includes three watershed systems – the Catskill, Delaware, and Croton Systems – that are located in the counties of Greene, Schoharie, Ulster, Sullivan, Westchester, Putnam, Dutchess, and Delaware.

A watershed is an area of land that catches rain and snow that drains or seeps into a marsh, stream, river, lake, or groundwater. This water eventually gets stored in reservoirs, a place where water is collected and kept for use when wanted, such as to supply a city.

The New York City Watershed System provides more than 90 percent of New York City's water supply. This comes to approximately 9.5 million people.

New York City makes sure that this water is safe by treating it at the source rather than building a costly filtration plant. The source is the land that surrounds the streams, rivers, lakes, and reservoirs.

"In 1996, all of the municipalities in the New York City watershed region came to an agreement. They wanted to avoid the creation of a huge filtration plant. Instead of a plant, they agreed to have small projects throughout the region to provide the public with clean water with minimal filtration.

"This is how our New York City Watershed Environmental Assistance Program came about," said Rifat Salim, project manager, U.S. Army Corps of Engineers.

coordinator with the Delaware County Soil and Water Conservation. "The new culvert is almost seven times larger."

He added, "The new culvert is designed to withstand a 100-year storm event, plus 20-percent additional water flow." This is a flood whose strength and water height are predicted to occur, on average, about once in 100 years.

Less Flooding Means A Safer Community

"During storm events, the old undersized culvert would plug up with woody debris causing water to overtop the culvert and flood Odell Lake Road, making the road an unreliable access route in an emergency," Dutcher recalled. "Odell Lake Road can now provide access for people and emergency responders to Stamford and areas north in the county when the West Branch of the Delaware River and its tributaries flood the lower valleys."

Less flooding also means less stormwater runoff, resulting in a healthier brook and cleaner water supply.

To further control stormwater runoff, the stream banks along the culvert were restored and stabilized. Rock was placed along the banks to hold down the fine sediment from running into the brook.

With the previous culvert, the stormwater movement carved or scoured out a pool in the bed of the brook over time, further increasing the flow of sediment into the brook.

The rock placement is stabilizing the banks, preventing this from occurring in the future. To provide additional stabilization, native vegetation was planted along the banks, including willows, dogwoods, and apple trees.

"Floodwaters will drain from the road and filter through this vegetation before entering the brook," said Dutcher.

The plants' roots stabilize the soil and the vegetation traps and absorbs sediment and pollutants, like harmful phosphorus and nitrogen particles, from entering the brook. This improves the quality of the water, maintains the brook's temperature, and fosters the creation of fish and aquatic habitats.

A healthy environment for aquatic life also includes the ability to migrate and breed. "The old culvert did not allow for fish passage up stream of the culvert," Dutcher noted. "The new culvert has a natural stream bottom through it and allows for all organisms to freely pass under the road."

This project also addresses the future threat of climate change.

"With the possibility of increasing storms events, climate resiliency knowledge like this is needed," acknowledged Dutcher. "This project serves as a great reference on how to replace undersized structures."

With the new Odell Road culvert in place, the sound of heavy rain is no longer a threat of flooding for the Harpersfield community. Instead, it's a reminder that their new culvert is helping to keep their community safe, as well as improve the water quality of their brooks and streams for aquatic life and New York City's water supply. ■

About The Author



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