

Communities with Combined Sewers Adapting to a Changing Climate: Pittsburgh, Pennsylvania

Background

Pittsburgh Water is responsible for managing stormwater and wastewater conveyance in Pittsburgh, Pennsylvania and its surrounding areas. Pittsburgh Water is the largest water, sewer, and stormwater authority in Pennsylvania and serves approximately 500,000 people across the City of Pittsburgh and the surrounding areas. The city's sewer system is around 75% combined. The wastewater and stormwater collected in the sewer system is conveyed to the Allegheny County Sanitary Authority (ALCOSAN) for wastewater treatment.

Challenges

There are numerous stormwater and wastewater challenges in Pittsburgh, including aging infrastructure, population growth, changing climate conditions, combined sewer overflows (CSOs), basement backups, flash flooding, landslides, and impaired waterbodies. Pittsburgh Water is working to provide solutions that balance affordability and resiliency to current and future climate stressors.

Climate Impacts

Over the last century, Pittsburgh has experienced a steady increase in annual precipitation and storm intensity—a trend that is expected to continue. Based on an analysis conducted by Pittsburgh Water of over 60 years of historical rainfall data from the [National Weather Service](#), the size of the 95th percentile annual storm event has increased nearly 20% and the annual frequency of storm events greater than one inch has nearly doubled. Furthermore, the number of days with [severe storm events](#) has increased from around 15 per year in the 1950s to over 100 per today. Large, intense storms can pose challenges for managing CSOs and flooding.

To account for the impacts from changing climate conditions, Pittsburgh Water partnered with the RAND Corporation and Carnegie Mellon University (CMU) to generate localized climate projections. The results suggest precipitation rates and temperatures will continue to increase in the Pittsburgh area over the coming decades. By 2100, the depth of the 95th

Key Information

- **Location:** Pittsburgh, PA
- **Population served:** 500,000
- **Permit Number:** PA0217611 (Pittsburgh) and PA0025984 (ALCOSAN)
- **Key hazards:** increasing storm intensity, increased precipitation



Top image: basement flooding following a large storm event. Bottom image: road flooding and damage from landslide.

percentile storm event is projected to increase from 1.3 to 1.65 inches, and the annual volume of stormwater is projected to increase by 15-20%.

Solutions

Updating Stormwater Code

Using the localized climate projections, Pittsburgh Water produced projected design storm rainfall depths from 2020-2099. The updated design storms enabled Pittsburgh Water and the City of Pittsburgh to update their stormwater code to be responsive to projected changes in precipitation patterns. Instead of referencing precipitation depths from the [National Oceanic and Atmospheric Administration's Atlas 14](#),

Pittsburgh's revised stormwater code requires stormwater best management practices for new development be designed using the projected design storms developed by modeling for the year 2100. To support permittees and engage with the public, the city also developed a design manual, which includes guidance on the updated stormwater code requirements.



Stormwater BMP installed to meet updated stormwater code requirements.

Revised Fee Structure

Gathering data on potential changes to climate impacts also helped Pittsburgh Water assess their aging infrastructure, including the necessary changes to minimize CSOs and water quality degradation and prepare for the future. After realizing that the majority of their water quality and quantity issues, including CSOs, were due to their outdated sewer infrastructure, they began developing a more integrated stormwater management plan, as described in the [Climate Resilience Toolkit case study](#). The plan is designed to adapt with the growth of Pittsburgh and provide a way to pay for necessary changes. Pittsburgh Water created a fee structure based on impervious areas to raise the funds required to pay for future sewer projects. The impervious area of each customer parcel was assessed using geographic information system (GIS) mapping. Throughout the development of the stormwater plan, Pittsburgh Water engaged community and stakeholder groups through a stormwater advisory group to ensure development of an equitable stormwater rate plan.

Additional Information

For more information on [Pittsburgh Water](#), contact James Stitt, Manager of Sustainability, at jstitt@pgh2o.com. For more information on the [City of Pittsburgh](#), contact Kyla Prendergast, Senior Environmental Planner, at kyla.prendergast@pittsburghpa.gov. Additional information on Pittsburgh's CSOs and climate adaptation can be found here:

- [ALCOSAN's 2019 NPDES Permit \(PA0025984\)](#)
- [ALCOSAN's 2019 Clean Water Plan](#)
- [Robust Stormwater Management in the Pittsburgh Region Report](#)
- [City of Pittsburgh Stormwater Design Manual](#)