

Planning for Our Future: Effects of Climate Change on Combined Sewer Overflows

Introduction & Purpose

The Jersey Water Works (JWW) Combined Sewer Overflow (CSO) Committee recognizes that CSO permittees, communities, and stakeholders know that climate change can harm our sewer infrastructure, but may struggle with how to plan for climate resiliency. Recently, major events like Hurricanes Henri and Ida have raised awareness and increased visibility of our current sewer infrastructure capacity. New Jerseyans have felt and seen how many parts of our current sewer system cannot handle increasingly severe storms. In New Jersey's combined sewer system communities, where both storm water and sewer water are serviced by the same sewer, the impacts of increased storms and precipitation have a greater public risk. While CSO communities in New Jersey have recently completed CSO Long Term Control Plans (LTCPs) to meet environmental regulations to reduce CSO events from occurring, the question remains: are these plans adequate for addressing the impacts of climate change?

Effects of Climate Change on CSOs

Communities throughout New Jersey—from Camden to Trenton to Perth Amboy to Jersey City to Newark—face the risk of raw sewage draining directly into streams, rivers, streets, and homes during major rainfall events. That is because these cities are still served by antiquated sewer systems that handle runoff from streets and parking lots and wastewater from homes and businesses all in the same sewer. During storm events, the sewer overflows all that untreated stormwater, sewage, and wastewater into streets and nearby waterways. These overflows are a public health nightmare that is getting worse as storms are dumping more rain, sometimes more intensely, and are happening more often.

Scientists and engineers widely agree that there are three important effects of climate change on our existing CSO infrastructure:

- Total precipitation is increasing, and a higher percentage of that precipitation occurs in heavy storms, resulting in more runoff to be handled by sewer systems, potentially increasing public health concerns.
- Since the early 1900s, sea level rise has been occurring in New Jersey at a rate faster than the world average and is accelerating. The [2020 NJ Scientific Report on Climate Change](#) indicates that NJ has a 50% chance of sea level rising more than 1.4 feet by 2050 and 3.3 feet by 2100.
- With more severe storms comes a greater possibility of power outages. Many combined sewer systems rely on grid electric power to capture and treat stormwater, so power failure could cause more overflows.

Outside of selecting a typical storm year, the LTCPs did not provide much guidance on how CSO utilities expect to handle climate change. The most important impact facing the public is the increased potential for surface flooding in our streets and sewer backups into our homes. Since both sea level rise and the severity and frequency of storms are worsening, there is also a continuing need to adjust sewer systems to handle higher flows and increased sea level rise.

What Can We Do About It?

Past planning efforts have not been comprehensive. Effective plans should be flexible and adaptive to handle uncertain change and accommodate at least the most likely changes in the planning period. There are many methods for mitigation and adaptation to climate change. Generally, these methods fit into three different categories:

- Adapting to increased high-tide levels at sewer discharge points.
- Managing or mitigating increased flows in the sewers, including both total flow and peak rates.
- Providing climate resilient infrastructure.

Providing tide gates, dams, weirs, and valves at sewer discharges to bodies of water can mitigate backflow into the sewers and provide some relief from the impact of increasing water levels. In some cases, pumping systems will be needed to make sewers functional. Raising some sewers outfalls might be feasible. Adding green infrastructure or removing impervious surfaces reduces stormwater runoff flow to sewers and provides other community benefits. Storage of stormwater flows can be added to existing systems and be included in future development. Separation of stormwater and sanitary flows alleviates sewer capacity issues and can also reduce pollutant loads during CSO events. In some cases, building newer, larger sewers can help alleviate pressure on the sewer system and reduce the frequency of CSO events.

Critical infrastructure needs to remain operational during storms and if damaged or overwhelmed, must recover quickly to service. Resiliency of sewer infrastructure has grown in the last decade, and must be made part of the LTCPs. This includes the use of alternative power sources, such as renewable energy, that do not contribute to the climate crisis.

Impacts of climate change may not always be predictable and will likely change over time. Thus, infrastructure needs to be flexible. For example, weirs on sewers should be adjustable, pump capacities might need to be increased over the next 20–30 years. These climate change impacts must be considered in the modeling, design, and implementation of LTCP projects.

What to Do in NJ?

Agencies across the US are beginning to incorporate various levels of climate change planning. Planning periods incorporated in the current NJ LTCPs extend out over 40–50 years. There are 21 combined sewer overflow systems in New Jersey, mostly located in low-income and communities of color, suffering from the same problems across generations.

The LTCPs are being finalized through a series of public comments and comments by the New Jersey Department of Environmental Protection (NJDEP), as part of the CSO permitting process. When permits are renewed—projected to be completed in late 2022 or early 2023—the respective CSO permits will include the plans and will be renewed every five years. The permit renewal periods will be critical in reviewing climate resiliency and reducing the burden imposed on these communities. These renewals provide an opportunity to make the issue of climate change part of the dialogue. Public input will be sought during the permit renewals, presenting the opportunity for CSO permit holders to evaluate their climate assumptions, the available climate data, and gaps in the data, in order to fully address current climate science.

Public dialogue on CSO permits can encourage permit holders to continually revisit the impact of climate change over time, to take appropriate action. Regulatory and funding issues can also affect implementation of projects in the respective LTCPs. These changes can be addressed via the permits.

Some specific actions that JWW is recommending as the CSO LTCP permits are reviewed:

- Adopt an official state sea level rise standard to guide planning for CSO plans and projects.
- Revise the official design storm standard to account for increased inland flooding and combined sewage generation, ensuring appropriate stormwater and floodplain planning and management for CSO plans and projects. The design storm year should incorporate climate change modeling.
- Require utility permit holders to incorporate energy efficiencies and projects that will achieve zero carbon emissions from their treatment facilities. Failure to use clean and renewable energy sources will just further exacerbate the effects of climate change.
- Significant capital improvements will be required to address climate impacts, and stakeholders should advocate for more federal and state funding for such improvements. In addition, technical assistance should be made available to aid utilities to incorporate climate data in implementation of capital projects.
- Given the increased wet weather flow, consider stronger enforcement of Environmental Protection Agency's [nine minimum controls](#), which include basic maintenance practices such as regularly cleaning sewers and keeping regulators and tide gates functioning properly.

If you want to learn more:

1. EPA has done a high-level screening analysis of climate change impacts on CSOs in “A Screening Assessment of the Potential Impacts of Climate Change on Combined Sewer Overflow Mitigation in the Great Lakes and New England Regions”: https://www.epa.gov/sites/default/files/2015-10/documents/cso_climate_final.pdf
2. NJDEP provides guidance in “Local Planning for Climate Change Toolkit”: <https://www.nj.gov/dep/climatechange/>
3. NJDEP’s first scientific report on climate change summarizes the current state of knowledge regarding the effects of climate change on New Jersey’s environment in “2020 New Jersey Scientific Report on Climate Change.” (<https://nj.gov/dep/climatechange/data.html>)
4. The JWW CSO Committee has developed a report on this topic: “Planning for Our Future: Effects of Climate Change on CSOs.” (<https://www.jerseywaterworks.org/resources/planning-for-our-future-effects-of-climate-change-on-csos/>)
5. The Resilient Northeastern NJ project is developing an action plan for advancing flood and climate resilience in Northeastern New Jersey. Three educational videos are on the website www.resilient.nj.gov/nenj: “What Causes Flooding in Northeastern NJ?,” “Knowing Your Flood Risk and Building a Resilience Community,” and “How to Protect Your Family and Community from Flooding.”