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ERIN MOREY

New York City's *Wait...* Pilot Program: An Integrated Approach to Water Quality Improvement

A NEW PROGRAM TESTED IN A NEW YORK CITY SEWERSHED ENCOURAGES WATER USERS TO REDUCE WATER USE DURING RAINSTORMS, AND THEREBY IMPROVE MANAGEMENT OF COMBINED SEWER OVERFLOWS.

Even though New York City's waterways are healthier than they have been in over 100 years of water quality testing, the city continues to make considerable investments in solutions to improve water quality and manage combined sewer overflows (CSOs). These solutions include traditional gray infrastructure such as tanks and tunnels, along with green infrastructure like rain gardens and green roofs. Another new CSO reduction effort that has been pilot tested in one sewershed is *Wait...*, a behavior-change program that connects demand management to water quality.

Wait... uses real-time text message notifications to encourage voluntary reductions of discretionary water use in residential buildings during CSO events. Similar to the energy industry's promotion of peak demand reduction, *Wait...* encourages users to reduce water use when the sewer system is at or nearing full capacity.

BACKGROUND

The New York City Department of Environmental Protection (DEP) is the largest combined drinking water and wastewater utility in the United States, delivering more than 1 bil gal of drinking water and treating 1.3 bil gal of wastewater each day. New York City's sewer system is approximately 60%

combined and conveys both sanitary and storm flow during wet weather. DEP manages the city's 14 wastewater treatment plants (WWTPs), which are designed to handle two times dry weather flow. The city is currently capturing more than 80% of CSO, with DEP's current investment in gray and green infrastructure totaling \$4.2 billion. DEP is also developing long-term control plans; the anticipated investment for the approved long-term control plans is currently \$3.9 billion, increasing DEP's total CSO program investment to \$8.1 billion.

While these investments are effective, they are also costly: integrated solutions like *Wait...* are increasingly important in helping maximize environmental benefits while optimizing costs. *Wait...* is part of DEP's emerging integrated water management portfolio, which promotes a synergistic approach to water resources management through stakeholder involvement and programming that connects drinking water, stormwater, and wastewater goals in a mutually beneficial manner. DEP's Office of Integrated Water Management, within the Bureau of Sustainability, leads policy development and programming for this effort by assessing long-term impacts of population growth and climate change on the city's water resources and systems and developing partnerships and pilot programs to advance demand management, resilience, and water quality improvement.

PILOT PROGRAM

DEP is the first water utility in the United States to pilot a program like *Wait...* Phase 1 launched in May 2016 to residential buildings in the Newtown Creek sewershed in Brooklyn. Newtown Creek was selected for the first phase to further engage an active environmental community interested in water quality improvement. The stated goals of the program were to increase capacity in the city's combined sewer system during large storm events through

voluntary water conservation, reduce the concentration of wastewater in CSOs, and illustrate to a broad audience that individual actions can impact New York City's waterways. The Office of Integrated Water Management coordinated internally to build and launch the pilot program, working with DEP's Bureau and Wastewater Treatment (BWT) and Office of Information Technology (OIT) to produce a comprehensive technical framework and real-time notification system.

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Rainfall data, collected by BWT at the Newtown Creek WWTP that serves the pilot area, are remotely transmitted in real time to a data collection and alerting system managed by OIT at DEP's headquarters in Queens. DEP's alerting system is programmed to monitor when CSO thresholds are triggered and is linked to an external mass text-messaging service that facilitates the delivery of automated alerts to participants when CSO events begin and end.

When the CSO threshold established by BWT is reached, a first automated text alert is sent to participants, reminding them to wait before engaging in water-intensive activities in their homes, including washing dishes, doing laundry, taking showers, and flushing the toilet. When the CSO event ends, based on another threshold set by BWT, a second automated text alert is sent to participants, thanking them for waiting. The Office of Integrated Water Management also coordinated with DEP's Bureau of Public Affairs and Communications to build the program's web page and registration page to facilitate the enrollment process, and with the Bureau of Legal

Affairs to create a user agreement and privacy policy.

Outreach. The Office of Integrated Water Management hired a sustainability marketing firm, Futerra (consultant), to formulate a messaging campaign and creative assets to support the pilot program. DEP and the consultant completed a series of working sessions, including a five-day "creative sprint" to define communication channels, tactics, and creative assets intended to inspire behavior change. The program's

theme and messaging campaign, "Heroes Wait," provides participants with positive feedback and educates them on their connection to water quality in New York City: "The waterways of New York have been getting cleaner and healthier. Wildlife and people continue to enjoy the waterways in their neighborhood. But there can be a problem. When there's heavy rain, New York City's sewers can fill to capacity and a mix of stormwater and wastewater can end up in our waterbodies. You can be a hero by waiting to use water in your home when there's a heavy storm. All you have to do is *Wait...*"

On the basis of the messaging campaign and creative assets, DEP initiated a wide-ranging outreach program in May 2016 and used several strategies to engage the community and encourage participation, including street canvassing with brochures, postcard mailings, social media activity, partner organization e-mail blasts, and community presentations. At the conclusion of the outreach program in June 2016, 379 participants within the Newtown Creek sewershed had

enrolled in the pilot program. Approximately 95 individuals outside of the Newtown Creek sewer-shed also completed enrollment and were added to DEP's "Wait List" to be included in potential future pilot phases in other sewersheds.

Data collection and results. Pilot data collection began on June 6, 2016, and concluded on Nov. 30, 2016. DEP's primary metric for determining whether pilot participants voluntarily waited was a percent decrease in daily consumption,

enrollment strategies, implement technical back-end upgrades, and refine data collection and analysis. For example, DEP is particularly interested in engaging single-family residents in the two participating sewersheds in phase 2 to improve overall consumption and pilot analytics. Daily water consumption is measured at the building level in multi-family buildings in New York City, not the individual unit level, making it more difficult to discern individual consumption trends. By

DEP's alerting system is programmed to monitor when CSO thresholds are triggered and is linked to an external mass text-messaging service.

compared with an average baseline daily consumption (calculated from four months of consumption data), during a CSO event. DEP's comprehensive metering system enabled staff to analyze daily water consumption readings at the individual building level for both the baseline and CSO event analyses. Results indicate that water consumption among the 379 participants decreased an average of approximately 5% at the building level from baseline conditions during the 13 CSO events that occurred over the course of the six-month data collection phase. The average CSO event duration was 7.2 hours. Nine participants opted out of pilot participation but were still included in the analysis.

PHASE 2 AND BEYOND

In response to the initial success of the pilot program and significant positive feedback from participants and community stakeholders, DEP is initiating a second phase to further develop and expand the program to another sewershed. This second phase will enable DEP to investigate additional outreach and

targeting single-family buildings, the phase 2 consumption analysis will be more robust and should more accurately indicate whether participants waited. DEP is also interested in surveying past and future participants to gain a more in-depth understanding of behavior change trends and motivations among participants, and to identify qualitative metrics of success.

DEP will also use this second phase to analyze potential citywide implementation of *Wait...* and integrated water management benefits from scaling up the program, including improved water quality and CSO reduction. DEP's Office of Integrated Water Management is working to further analyze this critical link between demand management and wastewater flow. Although it is not a conservation program, since participants are simply delaying water consumption, *Wait...* will help demonstrate the link between water supply and wastewater systems in New York City. DEP anticipates launching the second phase of the program in spring 2018. More information and program updates can be found at www.nyc.gov/dep/wait.

ABOUT THE AUTHOR



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