OUR WATER TRANSFORMED

An Action Agenda for New Jersey's Water Infrastructure

JERSEY WATER WORKS

Smart infrastructure. Strong communities.

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ABOUT JERSEY WATER WORKS

Jersey Water Works is a cross-sector collaborative working to transform New Jersey's inadequate water infrastructure through sustainable, cost-effective solutions that provide communities with clean water and waterways; healthier, safer neighborhoods; local jobs; flood and climate resilience; and economic growth.

December 2017

THIS REPORT REPRESENTS A MILESTONE FOR JERSEY WATER WORKS. The collaborative is now two years old and more than 350 members strong. **With the release of this report, we launch into the next phase of our work — an intense focus on finding solutions to three high-priority impediments to the transformation of New Jersey's water systems:**

- The lack of sufficient, available funding for capital investments;
- The absence in many cases of a robust asset management plan that would help prioritize and direct those investments; and
- The need for sustained public education and outreach, to build support for those investments.

This report also puts New Jersey's water infrastructure challenges into a national context, highlighting steps taken around the country from which we can learn, connecting Jersey Water Works members to counterparts in other states, and holding up the Jersey Water Works collaborative as a viable model for addressing complex challenges.

The timing of this report could not be more fortuitous. **New Jersey is about to welcome a new governor, and we are hopeful that the need for innovation and investment to upgrade our water systems will be a high priority.** It is an opportunity we cannot afford to miss.

If we work together, we won't miss it. Jersey Water Works was formed to build the capacity across sectors to tackle the formidable challenge of making our water systems a foundational asset for economic growth. **By focusing on this small list of big challenges, we can develop smart solutions that build thriving and just communities**. If you are already a member of Jersey Water Works, we ask you to recommit your energies to advancing these priority solutions in both your daily work and in your involvement with the collaborative.

And if you are not yet a member, we invite you to join us! **Only with the engagement of everyone in the water sector can we meet these challenges.** The solutions outlined here will help us get there more quickly.

JANE KENNY
Whitman Strategy Group
Co-Chair, Jersey Water Works

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ACKNOWLEDGEMENTS

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This project was made possible by the members of the Jersey Water Works Steering Committee, who participated in a rigorous strategic planning process, guided the development of this report and provided inspiration throughout. Special thanks go to the topic team members who prepared the background materials, including Peggy Gallos, Association of New Jersey Environmental Authorities of New Jersey; Dan Kennedy, New Jersey Department of Environmental Protection; Jane Kenny, Whitman Strategy Group; Andy Kricun, Camden County Municipal Utilities Authority; Debbie Mans, NY/NJ Baykeeper; Daniel Van Abs, Rutgers University; and David Zimmer, New Jersey Environmental Infrastructure Trust. Additional thanks go to Andrew Hendry, New Jersey Utilities Association; Peter Kasabach, New Jersey Future; Larry Levine, Natural Resources Defense Council; Mark Mauriello, Edgewood Properties; and Shoshanna Page, New Jersey Urban Mayors Association, who helped synthesize the retreat outcomes and/or reviewed the final report. A full list of Steering Committee members may be found on the inside back cover of this report.

Daniel Van Abs deserves special recognition. As both a Steering Committee member and consultant to Jersey Water Works, he was the lead author of the background papers and provided technical and policy guidance throughout the process.

We extend our gratitude to Howard Neukrug, professor of practice, Earth & Environmental Science at the University of Pennsylvania, and Diana Lind, managing director at the University of Pennsylvania Fels Policy Research Initiative, who provided an important national context for this project.

Special thanks also go to New Jersey Future staff Chris Sturm and Jane Rosenblatt, who provide backbone support to Jersey Water Works. Chris was instrumental in conceiving this project and ensuring its successful execution from start to finish, and was the lead author of the Jersey Water Works sections of this report.

Thank you also to all the others who contributed, including editor Debbi Dunn Solomon and graphic designer Kate Vocke. We also thank Regina Podhorin for her expert facilitation and strategic advice.

Note: The participation of state and federal government members of the Steering Committee does not constitute individual or organizational endorsement of any of the recommendations presented here, especially regarding new funding or legislation.

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EXECUTIVE SUMMARY

WATER INFRASTRUCTURE IS INVISIBLE. People and businesses expect the ready availability of clean, affordable drinking water, safe removal of wastewater and efficient management of stormwater. But when water infrastructure fails — whether through a water or sewer main break, local flooding or pollution swept into a fishing stream — its impact becomes all too obvious.

This report reveals the alarming condition of New Jersey's water infrastructure and highlights the cross-sector collaboration led by Jersey Water Works to ensure healthy, sustainable communities. **The water infrastructure problem is too big for any one organization to tackle alone.** Century-old water pipelines are weak and obsolete, and dysfunctional systems combine raw sewage and rainwater after storms and discharge both into local rivers. Multiple individuals, agencies, companies and towns share the cost and responsibility. Managing these assets — planning ahead to maintain, upgrade and replace them — is expensive, requires special expertise and presents an enormous leadership challenge.

Jersey Water Works was formed as a collaborative effort among stakeholders from all perspectives — from consumers and community advocates to utility leaders and policymakers, to environmentalists and academics — to identify concrete solutions to improve New Jersey's water infrastructure and promote vigorous economies, healthy environments and excellent quality of life. An active steering committee of 25 representative thought leaders, five hard-working committees focused on measurable objectives, and a network of more than 350 members who champion shared goals have together produced the framework detailed in the following pages.

This "action agenda" provides clarity on how Jersey Water Works has brought so many stakeholders together to effect change, offers an in-depth understanding of the state's water infrastructure and the context for improvement, and outlines Jersey Water Works' consensus on practical solutions.

To move New Jersey's water systems forward into the 21st century, the collaborative launched a strategic planning process to identify major systemic obstacles and to develop priority solutions to overcome them. Multi-sector working committees supported by staff from New Jersey Future considered the possibilities based on local and national research. **The two most significant obstacles were determined to be the lack of adequate financing and the lack of robust asset management.** (See "Jersey Water Works: A New Kind of Change Agent" on p. 9.)

In order to achieve better outcomes in New Jersey and across the nation, Howard Neukrug and Diana Lind of the University of Pennsylvania argue that we must rethink how we manage, fund, design and rebuild our water systems. Their essay, which forms the middle section of this report, lays out a broad set of options that can move communities to a sustainable water future, such as realizing the enormous cost savings from repairing leaks that forfeit millions of gallons.

They also feature successful New Jersey examples such as recovering methane energy from wastewater and using rain gardens to mitigate flooding. (See "Transforming New Jersey's Water Infrastructure: A Call to Action and Innovation" on p. 15.)

"Our cities and states need a new roadmap to ensure water sustainability and community resiliency—to provide modern, reliable water services to all, to restore our waterfronts and waterways, and to keep our communities healthy and safe." — Howard Neukrug, Professor of Practice, Earth & Environmental Science, University of Pennsylvania

Three priority solutions emerged from Jersey Water Works' comprehensive strategic planning process. Each one will require all stakeholders to work together to press for solutions and build public will. (See "Jersey Water Works: Solutions That Form Our Action Agenda" on p. 33 for more details.)

- **Robust asset management** to enable water utilities to deliver the optimum level of service with the most community benefits at the lowest lifecycle cost.

- **Educated stakeholders** so that ratepayers and rate setters, consumers and policymakers can understand the value of investing in water infrastructure and the peril of deferring maintenance.

- **Government funding** initiatives to provide loans and grants to help implement asset management and upgrade systems.

Timing has never been better to address asset management. With the 2017 New Jersey Water Quality Accountability Act, the state has the potential to become one of the leaders in requiring drinking water systems to fund and implement asset management best practices. Jersey Water Works members will work together to develop recommendations for needed regulations to implement the law. Innovative thinking will help ensure that rules go beyond requiring reporting to state agencies, and ensure transparency so that consumers know how well their water system performs, and whether it is getting better or getting worse.

Responsibility for transforming New Jersey's water systems falls to us all. The Jersey Water Works collaborative engages people from an array of viewpoints, including policymakers, public and private utilities executives, community advocates, engineers and environmentalists. This report provides us with the latest innovations in water infrastructure and a strategic focus on priority solutions that, by guiding the efforts of the collaborative and of individual organizations, can ensure our continued progress.

JOIN JERSEY WATER WORKS AT

www.JerseyWaterWorks.org

TO SHARE YOUR VISION OF HOW WE CAN TRANSFORM NEW JERSEY'S WATER INFRASTRUCTURE AND PROVIDE THE WATER RESOURCES FOR GOOD HEALTH, VIBRANT ECONOMIES AND RESILIENT COMMUNITIES.

New Jersey's water infrastructure problem is too big for any one organization to tackle alone. So Jersey Water Works was formed as a collaborative effort: working together with stakeholders from all perspectives — from consumers and community advocates to utilities leaders and policymakers, to environmentalists and academics — to identify concrete solutions to ensure that the state's cities and towns have the 21st-century water infrastructure they need to thrive.

JERSEY WATER WORKS:
A New Kind of Change Agent

A WATER INFRASTRUCTURE CRISIS IS BREWING

across the country and in New Jersey. While many of New Jersey's water systems are well maintained, too many more are not only aging, but past their useful lives, suffering from decades of inadequate investment. Water and sewer mains leak and break; lead leaches from service pipelines and threatens children's health; and local flooding impairs public health, daily life and commerce. The situation is especially acute in the 21 communities where raw sewage overflows into rivers and bays after rainstorms, and can sometimes back up into homes and streets.

"If there's an issue with water infrastructure anywhere in the country, it can also be found, in some form, in New Jersey. These challenges also create an opportunity for New Jersey to lead. If we can solve these problems in New Jersey, we can show other states how to solve them too." — Larry Levine, Water Program attorney at the Natural Resources Defense Council and Jersey Water Works Stteering Committee member.

But the water infrastructure problem is too big for any one organization to tackle alone. Multiple individuals, agencies, companies and towns share the cost and responsibility. **So Jersey Water Works** formed as a collaborative effort that engages the full spectrum of stakeholders — governmental, business, community, labor, nonprofit and academic — working at different scales, from the neighborhood all the way up to national. In just two years, Jersey Water Works has grown into a visible, active movement committed to "Smart Infrastructure. Strong Communities." Together, its network of 350 members champions its shared goals and 2,500 have subscribed to follow its progress.

"By aligning all these entities and diverse perspectives to advance shared goals, Jersey Water Works can accomplish so much more than any member organization could accomplish individually. It is a great example of the whole being much greater than the sum of the parts." — Chris Daggett, president and chief executive officer of the Geraldine R. Dodge Foundation and co-chairman of the Jersey Water Works Finance Committee.

Jersey Water Works Shared Goals

Jersey Water Works members are committed to advancing the following shared goals over the next three to five years:

EFFECTIVE GREEN AND GRAY INFRASTRUCTURE

Optimized gray infrastructure such as concrete pipes combined with green, nature-based engineering will provide communities with quality water services that reduce flooding, protect the environment and benefit host communities.

SMART COMBINED SEWER OVERFLOW CONTROL PLANS

Cost-effective solutions adopted in the 21 communities most burdened by raw sewage in their stormwater will meet or exceed their permit requirements and create more resilient, healthy local economies.

FINANCIALLY SUSTAINABLE SYSTEMS

Affordable, efficient systems will generate adequate operating and capital funds to ensure that the water infrastructure is updated and maintained in good repair.

EMPOWERED STAKEHOLDERS

Local officials, community stakeholders and ratepayers will participate actively and influence the planning and management of their water infrastructure.

The Jersey Water Works website has a full list of the collaborative's 12 sub-goals.

WORKING TOGETHER TO MAKE A DIFFERENCE

Nearly 100 individuals associated with a variety of public and private organizations contribute to Jersey Water Works' committees. In each of the past two years they have adopted annual work plans, and they meet regularly to discuss progress, seek cross-sector consensus and devise realistic solutions. During this time, committee members have pursued joint projects and found new ways to combine different perspectives and smart ideas to address New Jersey's water challenges. Among the committees' signature projects:

- The **Best Practices Committee** created the New Jersey One Water Awards to promote innovation and collaboration in the public, private and nonprofit sectors. "The Awards highlight projects in New Jersey that exemplify real solutions for the water issues of today," said Brian Carr, vice chairman of the New Jersey chapter of the American Water Works Association and a Jersey Water Works member.

"I really have never seen anything like what Jersey Water Works is doing with its various stakeholders, and the passion and commitment just rising out of nothing," said Debbie Mans, executive director of NY/NJ Baykeeper and Jersey Water Works Steering Committee member, at the collaborative's 2016 conference. "It's very exciting."

- The **Finance Committee** finalized two case studies in partnership with the New Jersey Environmental Infrastructure Trust (NJEIT), articulating the business case for better asset management on the part of wastewater and drinking water utilities. According to Finance Committee Co-Chairman David Zimmer, who is the executive director of the NJEIT, "These case studies demonstrate the benefits of wise investments for the systems, ratepayers and environment."

"That conversation wouldn't have happened without Jersey Water Works. It has shown itself to be an indispensable broker across many different sectors."

— Meishka Mitchell, vice president at Cooper's Ferry Partnership and Community Engagement Committee co-chair

- The **Municipal Outreach Committee** facilitated Jersey Water Works' partnerships to present training workshops for hundreds of local officials, utility staff, environmentalists and community stakeholders. As committee co-chair and New Jersey Urban Mayors Association project specialist Shoshanna Page explained at the "Unearthing Water Infrastructure Communications" workshop, "By building support to fix our water infrastructure, we are solving environmental justice and economic issues that have been plaguing communities for decades."
- The **Green Infrastructure Committee** prepared step-by-step "actions" for the 445 towns participating in Sustainable Jersey's municipal certification program. "With the varied expertise of the committee members, we developed a 'how-to' guide to help local teams plan and build green infrastructure projects. Their success not only helps them get certified, it improves water quality throughout our state," notes committee co-chair Rob Pirani, program director at the NY-NJ Harbor & Estuary Program.
- The **Community Engagement Committee** facilitated a wide-ranging collaboration among state regulatory staff, sewer utility representatives and environmental not-for-profit organizations to shape guidelines for effective public outreach regarding combined sewer overflows. "That conversation wouldn't have happened without Jersey Water Works. It has shown itself to be an indispensable broker across many different sectors," emphasized Meishka Mitchell, committee co-chair and vice president at Cooper's Ferry Partnership.

The work of the collaborative has created a fertile environment for a new level of attention to all aspects of water infrastructure in New Jersey, including:

- **Local implementation.** Jersey Water Works members are asked to commit annually to new initiatives in line

with its shared goals. Included among 33 member commitments announced in 2016 were the Cooper's Ferry Partnership's flood mapping app for residents, Middlesex Water Company's capital investment program, the City of Hoboken's water system capital improvement plan, Camden County Municipal Utilities Authority's expedited combined sewer system upgrades, and Jersey City's "Year of Water" campaign, as well as a host of stream clean-ups, workshops and promotional efforts.

- **State government activity.** When the New Jersey Legislature created a Joint Task Force on Drinking Water Infrastructure to analyze the urgent need for investment and issue recommendations, they called numerous witnesses, the majority of whom are leaders of Jersey Water Works. In addition, the governor signed a new law, the Water Quality Accountability Act, which requires all sizable water purveyors to develop and fund proactive asset management plans.
- **Multi-community collaboration.** Municipal "action teams" such as Newark DIG community members work together with state and local officials and with the Rutgers University Water Resources Program to build green infrastructure projects to capture stormwater runoff and enhance environmental justice in eight of the state's oldest and most distressed cities. Jersey Water Works convenes a peer support network so these teams can learn from each other's successes.

NEWARK DIG
doing infrastructure green

HOW DOES JERSEY WATER WORKS "WORK?"

The Jersey Water Works collaborative employs a Collective Impact approach in order to engage people from an array of perspectives, including federal, state and local officials, public and private utility executives, community advocates, scientists, engineers and environmentalists. Governed by a 25-member Steering Committee, Jersey Water Works advances projects via five active working committees, more than 350 members who commit to supporting the group's shared goals, and a growing list of engaged stakeholders.

Individual Efforts, Collaborative Action

The Collective Impact approach brings people together in a structured way to solve complex social problems that cannot be tackled effectively by a single policy, organization or program. The approach calls for multiple entities from different sectors to adopt a common agenda, align their efforts and share measurement. To improve the chance of success, Collective Impact initiatives have centralized infrastructure — known as a backbone organization — with dedicated staff whose role is to help participating organizations shift from acting alone to acting in concert.

Jersey Water Works engages hundreds of people at different levels, with day-to-day support from the backbone staff.

The collaborative's day-to-day activities are facilitated by New Jersey Future staff that serve as the "backbone organization" through communications, convening, and measuring progress. The collaborative's website, www.JerseyWaterWorks.org, features details on the progress of its initiatives, updates on partner activities, and relevant resources. Together, its measurable success has been driven by the shared goals developed by the members and adopted by the Steering Committee in 2015.

"New Jersey's water infrastructure has been held together patchwork-style for a long time … And while the costs of fixing the problem are high in the short term, the costs of doing nothing will be far higher in the long term."

— Governor James Florio

"We cannot be discouraged because it is difficult. Other cities across the nation have proven this is beneficial. All we need is the will."

— Governor Christine Todd Whitman

Governors Florio and Whitman serve as the honorary co-chairs of Jersey Water Works.

THE RESULT?

Visible improvements in New Jersey's water infrastructure range from new stormwater parks to workshops on best-practice solutions to new legislation, financing tools and regulatory approaches. Momentum is building through annual conferences, meetings, media stories, community engagement, newsletters, and a robust social media presence.

The members and leadership are also committed to verifying progress toward the shared goals, using a rigorous comprehensive measurement system to guide their work. This system includes a list of indicators to be measured for each sub-goal, in order to understand where the collaborative is succeeding and where its work needs to be adjusted.

Maintaining the collaborative's momentum requires resources, and Jersey Water Works is deeply appreciative of its funders. The Geraldine R. Dodge Foundation is a key funder and partner, supporting the development of the collaborative and its backbone staff from the beginning. In addition, many philanthropic organizations, both local in New Jersey and national, fund the efforts of individual members. Sponsorships help fund the collaborative's annual summer membership meeting and December conference.

HOW DID JERSEY WATER WORKS GROW INTO SUCH A STRONG COLLABORATIVE?

In 2013 the New Jersey Department of Environmental Protection (NJDEP) announced its intention to require 21 New Jersey communities to upgrade their combined sewer systems. These old dysfunctional systems combine both sewage and stormwater in the same pipes and often discharge raw sewage directly into rivers and bays after rainstorms. Upgrading the systems will require a generational investment that will strain the resources of economically distressed communities.

"The Jersey Water Works collaborative has set itself the loftiest of goals -- to ensure that the state's cities and towns have the 21st-century water infrastructure they need to thrive."

— Daniel Van Abs Ph.D., associate professor of practice for Water, Society and the Environment at Rutgers University and Jersey Water Works Steering Committee member.

With funding from The Geraldine R. Dodge Foundation, New Jersey Future produced two research reports stressing the urgency and scope of the problem, as well as the opportunity to strengthen communities by modernizing and greening their infrastructure. In one, *Water Infrastructure in New Jersey's CSO Cities*, Rutgers water expert Daniel Van Abs Ph.D. characterized the combined sewer-storm overflow problem in New Jersey and necessary requirements for upgrading the systems. In a companion report called *Ripple Effects*, New Jersey Future used case studies featuring four New Jersey

L to R: Dan Kennedy, New Jersey Department of Environmental Protection; Department of Environmental Protection Commissioner Robert Martin; Chris Sturm, New Jersey Future; Jane Kenny, Whitman Strategy Group and Co-chair, Jersey Water Works; Dan Van Abs, Rutgers University, Jane Rosenblatt, New Jersey Future; and David Zimmer, New Jersey Environmental Infrastructure Trust, who said, "I can personally attest to the power and effectiveness of getting this large group of relevant individuals with disparate perspectives in one room, working toward one goal: developing creative ideas and solutions for state and local decision makers regarding water services."

cities to illustrate how water infrastructure can positively or negatively affect local communities.

In mid-2014, a group of thought leaders convened to craft an actionable response to the reports' findings. A broad spectrum of organizations worked together, including investor-owned and governmental utilities, state and federal regulatory and financing agencies, environmental and smart-growth groups, local officials, community organizations, engineering firms, and the academic and philanthropic communities.

The group agreed that the NJDEP's regulatory imperative affords cities and utilities an opportunity to go beyond baseline compliance. "Utilities should see compliance as the floor of our aspirations, not the ceiling," Andy Kricun, executive director of the Camden County Municipal Utilities Authority, explained. "We should not only achieve compliance by making necessary, long-overdue investments in water infrastructure but also use innovative solutions, like green infrastructure, to create resilient cities with healthy environments and vibrant economies."

They left the meeting with an adopted shared purpose and a month later published an Agenda for Change with guiding principles and action steps they believed would catalyze the transformation of water infrastructure throughout the state. New Jersey Future began organizing committees for this new working group to advance the agenda. Soon all parties involved realized that the scale of the problem called for a different level of response and agreed to form a more robust collaborative, following the Collective Impact model.

In 2015, working group leaders launched Jersey Water Works with 12 goals and a common purpose: to take advantage of the urgent challenge to repair the state's inadequate water infrastructure and realize the important connection between smart management of its water resources and enjoying sustainable, healthy communities.

In 2016 and 2017, Jersey Water Works became stronger, more diverse and even more strategic. The progress described above reflects the joint efforts of increasing numbers of advocates and experts. Together they launched a strategic planning process to identify the biggest systemic obstacles and the "priority solutions" needed to overcome them.

(See "Solutions That Form Our Action Agenda" later in this report.)

All sectors agree that sustainable access to clean water is essential to "Smart Infrastructure. Strong Communities." Jersey Water Works identified shared goals and more detailed solutions that form a solid foundation for shared action. "Every person, business and community in New Jersey is a stakeholder when it comes to water infrastructure, " explains Jane Kenny, co-chair of the collaborative. "Moving forward together, adapting our operations in concert with the solutions detailed in this report, we can truly transform our water resources. Please join us!"

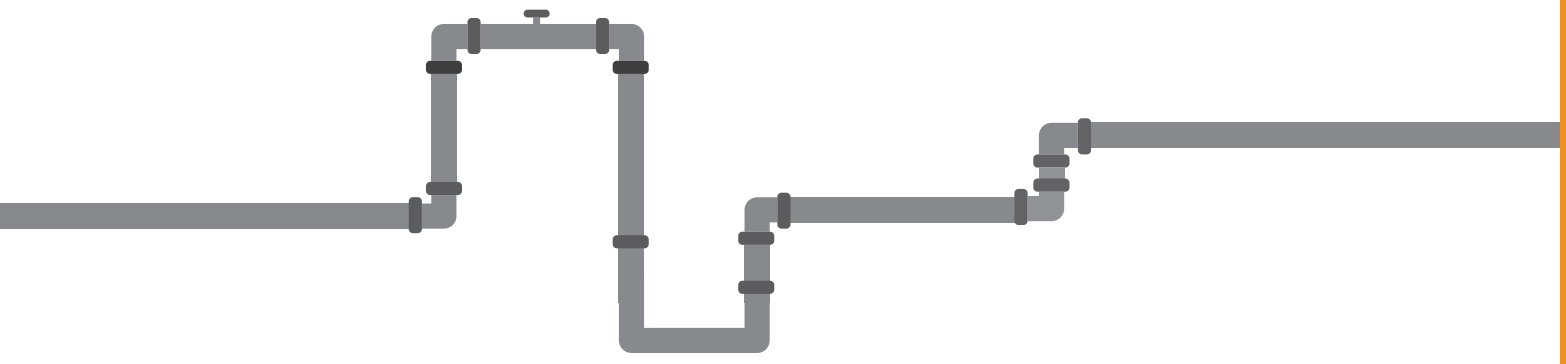
The condition of New Jersey's water infrastructure is no different than that found in many parts of the United States — that is to say, it varies from excellent to vulnerable to chronic failure. National experts Howard Neukrug and Diana Lind explain in the following essay that we have the tools, the knowledge and even some of the funding mechanisms to manage these crises — if we choose to!

TRANSFORMING NEW JERSEY'S WATER INFRASTRUCTURE:

A Call to Action and Innovation

Howard Neukrug, Professor of Practice
Earth & Environmental Science, University of Pennsylvania

Diana Lind, Managing Director
Fels Policy Research Initiative, University of Pennsylvania



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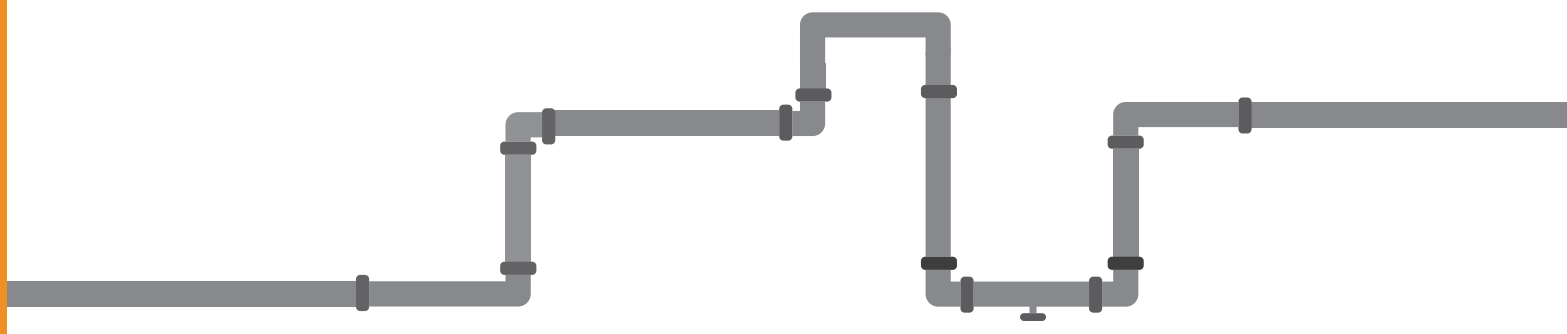
Prior to joining the Fels Policy Research Initiative, Diana Lind was the director of digital audience development for Philadelphia Media Network, which owns the *Philadelphia Inquirer*, *Daily News*, and Philly.com. From 2008 to 2014, she served as editor in chief and executive director of Next City, an independent online urban policy website. She began her career as a freelance architecture critic for *Architectural Record*, authored the book *Brooklyn Modern: Architecture, Interiors & Design* (Rizzoli, 2008) and received a fellowship from the Van Alen Institute in 2011.

HOWARD M. NEUKRUG P.E.

Professor of Practice in Water Leadership and Innovation, University of Pennsylvania; Former Chief Executive Officer and Commissioner, Philadelphia Water

Howard Neukrug has nearly 40 years of experience in the water industry, most recently prior to his appointment at the University of Pennsylvania, he served as the chief executive officer and commissioner of Philadelphia Water. He is a national expert and advisor to cities, water systems and foundations on topics of water infrastructure, technology, science, policy, regulations and management and water's role in creating sustainable and resilient cities. Mr. Neukrug is a member of the U.S. National Drinking Water Advisory Council, principal of CASE Environmental LLC, senior advisor to the Global Water Leaders Group and chair of its Leading Utilities of the World CEO Network. At Penn, Prof. Neukrug teaches courses on the future of urban water systems and is in the development stage of creating a regional and global water center for the university.



PART ONE
INTRODUCTION

In cities and townships across the country, water infrastructure and management has become one of the most important policy issues of our time. This year, a series of hurricanes left cities such as Houston inundated with water, turning whole neighborhoods to rot. In Toledo, Ohio, a nutrient-rich Lake Erie produced harmful algae blooms that can threaten the public water supply for nearly 300,000 people. Pittsburgh's water system issued regular boil-water notices resulting from failures in its aging pipes and reservoirs. And in Flint, Michigan, three years following a significant failure in its drinking water system, lead-tainted water continues to flow from residents' taps.

Crisis is the new normal. So-called "hundred-year storms" now happen every few years and century-old water systems are reaching structural obsolescence. This, when combined with fiscal difficulties in our cities and water utilities, wreaks havoc on our public works infrastructure and the lives of the people who depend on it, and on our homes and businesses. In a startling example of how water safety has become a primary concern, a recent study by Chapman University found that 50 percent of Americans now fear polluted drinking water, making this among the country's top fears in 2017. On a global scale, the 2017 World Economic Forum Report cited extreme weather events and water crises as the number two and number three greatest risks, after weapons of mass destruction.

New Jersey, thankfully, did not experience any major catastrophes this year, and has many examples of great public and private water systems statewide. But even in the best of times, the state regularly sees residents' quality of life diminished by water infrastructure systems that do not meet today's challenges. A typical rainstorm can cause sewage overflow into Hoboken's rivers and basements; it can flood Camden's downtown streets and, as a result, suspend rail service, stranding thousands who depend on it to get to work. Pervasive lead in school drinking water threatens a generation of schoolchildren. Water main breaks are common. And as experiences such as Hurricane Sandy have shown, it only takes one severe storm to cause billions of dollars' worth of damage, endanger lives, and cripple the economy.

Whether it is a sudden natural disaster or a systemic failure that is years in the making, we ignore these threats at our peril. Yet we have the tools, the knowledge and even some of the funding mechanisms to manage these crises, if we choose to. Yes, this is a choice! As investments in water infrastructure in Jersey City have shown, money spent on upgrading infrastructure can pay back dividends in tourism and real estate values. As Paterson's Great Falls project demonstrates, prioritizing clean waterways can bring together communities and prove a selling point for a city.

> ***Crisis is the new normal. So-called "hundred-year storms" now happen every few years and century-old water systems are reaching structural obsolescence ... Yet, we have the tools, the knowledge and even some of the funding mechanisms to manage these crises, if we choose to.***

Most importantly perhaps, forward-thinking, collaborative policy-making can and should be used to create positive change statewide. For example, through cross-sector collaboration, Jersey Water Works has influenced state policy, provided resources on best practices, and raised awareness of innovative projects. By working openly and transparently with water utilities, environmental organizations, government regulators, community, and local officials, Jersey Water Works has exemplified leadership in effecting change through strong stakeholder involvement and communications.

> *New Jersey will welcome a new governor in January, and, with the new administration, an opportunity to invest in the state's infrastructure, preparedness, and resilience.*

However, much more work is needed, and with so much evidence of the significant water infrastructure needs ahead of us, there is no time like the present to plan for the future. The moment is ripe to take on these challenges and help ensure the health and prosperity of the state.

PART TWO
BACKGROUND ON WATER SYSTEMS IN NEW JERSEY

As a densely populated, highly urbanized state, New Jersey can reap huge dividends from targeted, proactive investments in its infrastructure. For example, it is estimated that 130 million gallons of treated, potable water are wasted across the state each day due to cracked water mains, leaks, and water loss.[1] Research suggests that infrastructure repairs alone could save 50 million of those gallons per day — an amount equal to the daily water use of about 700,000 New Jersey residents, or a population 2.5 times the size of Newark — and pay for themselves through increased revenues and decreased costs. As another example, a focused strategy to replace old lead pipes with new service lines into people's homes could quickly affect hundreds of thousands of lives for the better, especially in our state's low-income communities. The combined sewer systems in six cities — Bayonne, Camden, Elizabeth, Jersey City, Newark and Paterson — account for 70 percent of the state's combined sewer overflows (CSOs); addressing these cities' CSO problems would significantly improve the quality of life for those cities' residents, as well as improve access to their waterfronts and directly confront issues of environmental justice.

New Jersey is also a state blessed with abundant natural resources. It is home to 9,000 farms: Food and agriculture are the state's third-largest industry. In 2013, New Jersey commercial fishermen caught 120 million pounds of seafood valued at $133 million. These major industries also rely on access to clean water, but New Jersey has identified an astounding 13,000 miles of rivers (over two-thirds of all of New Jersey's river miles), more than 26,000 acres of lakes, reservoirs and ponds, nearly 200 square miles of bays and estuaries, and almost 372 square miles of ocean and near coastal waters where polluted runoff from cities and towns made the water unsafe for fishing, swimming, boating, drinking, and/or other uses protected by state and federal law.[2] In addition, the groundwater systems in New Jersey have been weakened by overuse and are, in places, contaminated from saltwater intrusion or other natural and manufactured pollutants.

Whether urban, rural or something in between, throughout New Jersey there is another common problem: The state's water infrastructure is not only aging but is becoming outdated and in need of replacement with newer technologies and/or newer materials in order to save energy, reduce costs, and improve service and water quality. Today, 20th-century technologies are commonly used to treat water and wastewater that is distributed and collected in a network of 19th- and early 20th-century water and sewer pipes. Many water supply and wastewater treatment plants are reaching the end of their lifespans and need major rehabilitation. In some cases, there is a wholesale need to rethink the type and capacity of the water system that is to be replaced. This takes time, money and planning. New Jersey is home to more than 200 wastewater treatment plants, nearly 600 drinking water systems, hundreds of ancillary pumping stations, reservoirs and storage facilities, hundreds of thousands of valves and hydrants, and thousands of miles of water and sewer pipe. Many are reaching the end of their useful

Fixing CSOs makes exploring waterways a safe option for urban residents. Here, Paterson schoolchildren prepare to venture onto the Passaic River with staff from the National Park Service and members of the Bronx-based organization Rocking the Boat.

service lives and along with the need for reinvestment there is a once-in-a-lifetime opportunity to modernize the water infrastructure systems.

Despite these limitations, New Jersey continues to provide excellent, high quality drinking water throughout the state through its network of 582 community water systems, owned by a mix of publicly-owned and private, investor-owned utilities. About 40 percent of New Jersey's population is served by about four of those investor-owned utilities (primarily New Jersey American Water, SUEZ, Middlesex Water, and Aqua-NJ). Those four firms, along with Veolia and CH2M, are also contracted to operate a number of municipally owned systems. Preliminary results from a forthcoming Rutgers University study indicate that the investor-owned systems tend to charge significantly more for residential drinking water than the publicly owned systems with similar water sources. However, investor-owned systems also tend to reinvest capital dollars at much greater rates into the renewal and upgrade of their water piping networks and facilities. One of the major challenges facing publicly owned and operated drinking water systems is inadequate capital funding for system reinvestment. An aversion to reinvesting can often be traced back to one of two things: local officials who are reluctant to raise rates to cover the full cost of necessary capital investments, operation, and maintenance; or an underestimation by these same decision makers of the potential dollar savings to be gained from such investments.

There is no one-size-fits-all approach to rebuilding the state's water infrastructure, but new ideas are being generated throughout the state. The Camden County Municipal Utilities Authority (CCMUA) provides just one example of how to upgrade 20th-century wastewater treatment systems to a 21st-century sustainable and resilient model by investing hundreds of millions of dollars in infrastructure. Other agencies are employing new approaches that include recovery of energy (in the forms of waste heat, methane and kinetic energy) and nutrients from the wastewater, and the "conservation of rainwater" through the use of rain gardens, green roofs, and urban forestry, thereby reducing the amount of stormwater running off into the sewers and reducing overflows, river pollution, and costs.

> ***"The state's water infrastructure is not only aging but is becoming outdated and in need of replacement with newer technologies and/or newer materials in order to save energy, reduce costs, improve service and water quality.***

As these and other advances suggest, New Jersey's residents, community groups, water utilities, municipalities, environmental organizations and regulators are using creative approaches to attack the water infrastructure challenges of today.

PART THREE
NEEDED: TRANSFORMATIONAL CHANGE

We can no longer continue to do our water business as usual. Water is just too vital to the sustainability of our communities and to the public's health not to be the highest priority. Our nation's cities and towns, regions and states need a new vision, a new plan, a new roadmap to ensure water sustainability and community resiliency — to provide modern, reliable water services for all, to restore our waterfronts, natural waterways and beaches, and to keep our communities healthy and safe. Cities and towns need to work with their water systems to accomplish this using a systematic approach that leverages our funds and provides benefits to the community at the least cost possible.

This challenge comes at a time when the water sector recognizes that the cost and complexity of our water environment challenges — floods, scarcity, emerging drinking water contaminants, polluted runoff, sewage overflows, rising tides — require us to seek Collective Impact solutions. In our cities and towns, new alliances among utilities, governments, private companies and community organizations are needed to create solutions that have multiplier effects. Fixing infrastructure cannot be the sole end; this work must be framed and executed as an opportunity to create jobs, reduce health risks, enhance property values, support education, and improve the livability and sustainability of our neighborhoods. **By working together through collaborative politics, leveraged financing, and civic leadership, we will be able to connect water infrastructure renewal and replacement more fully with the greater goals of creating greener, more equitable, and more sustainable communities.**

At the same time, the water sector's management expertise and line workers are phasing out of the ranks through retirement. As these veterans leave the water industry, much of their operational experience and institutional knowledge leave with them. But that professional churn also provides an opportunity, insofar as it enables new leaders to take on contemporary water infrastructure challenges.

The health of our waterways (in terms of water quality) and the quality of our drinking water have improved dramatically over the past 50 years, thanks to investments made in our drinking water and wastewater treatment systems in the 1970s and 1980s. However, many legacy contaminants, including lead, mercury, arsenic, PCBs and PAHs, remain. In addition, emergent contaminants, such as endocrine disruptors and other pharmaceutical byproducts, are surfacing. We will likely continue to struggle for the rest of this century to find the technologies and the funding to address these water quality issues.

> ***"Our nation's cities and towns, regions and states need a new vision, a new plan, a new roadmap to ensure water sustainability and community resiliency — to provide modern, reliable water services for all, to restore our waterfronts, natural waterways and beaches, and to keep our communities healthy and safe.***

Beyond water quality concerns, the availability of water is also a significant issue confronting water planners. Indeed, water scarcity issues have plagued and perplexed water experts, scientists and politicians for years even in water-rich states like New Jersey. Whether we are dealing with chronic issues stemming from overdrawn aquifers, acute conditions caused by drought, or water system failure caused by disinvestment-related equipment failure, by extreme weather, or by security threats, the availability of water is clearly an issue affecting the sustainability and resiliency of our communities. Our water supplies must be available not only today, but for future generations and with population growth in mind.

The 20th-century regulatory framework was focused around the elimination of significant river and lake pollution events emanating largely from the discharge of industrial water and untreated wastewater directly from pipes and sewer outfalls. Today, largely because of the Clean Water Act construction grants program of the 1980s, our focus has shifted to the more ubiquitous and more difficult-to-control problem of stormwater runoff and the pollutants it sends from the land into our waterways. These new pollutants require a more forward-thinking, progressive and integrative approach to the management of our land and our water in order to make our rivers and streams fishable and swimmable for the 21st-century.

Timing is everything, and this confluence of factors — both the positive, which include new ways of thinking within the water sector, and the negative, such as climate change and increased levels of severe storms — make the coming years' prioritization of water infrastructure critical. **We must harness the current hunger for new ideas in the water sector with a greater emphasis on rethinking how we manage, design, and build our infrastructure for the future.**

PART FOUR
THE "ONE WATER" SOLUTION

Just as cities were once built around access to ports and waterways, today's cities will thrive only when their water infrastructure meets residents' needs. River waterfronts that once were ignored at best, and used as open sewers at worst, are now many cities' greatest advantage. Citizens of cities and towns need these waterfronts to be safe, attractive and accessible. Creating and maintaining great 21st-century communities will require resilient water systems supported by and for their host cities and towns; and they will require affordable access to clean water for everyone.

What happens when these basic needs are not provided? Consider recent findings that there is lead in the drinking water of a number of New Jersey's schools. Young families that are considering where to live may avoid communities with schools that have lead in their drinking water. Meanwhile, for the many without the means or desire to move, quality of life is compromised, as is the tax base on which their government relies. Much as we consider schools and safety to be cornerstones of our communities, we must be steadfast in ensuring access for everyone to such basic necessities as clean water.

Further, what happens when these schoolchildren go home? Many live in older houses that have internal lead plumbing. Something needs to be done there as well. The replacement of privately owned lead fixtures is a very expensive proposition, costing thousands of dollars per household. But, in the interim, a significant amount of the risk can be abated by educating residents in at-risk homes to run their water for a few seconds before drinking, especially after long periods of time in which the water has lain idle in the pipes (i.e., first thing in the morning or right after school or work).

The breadth of this mandate requires a multi-sector response from public, private, and civic entities. Water utilities can no longer operate primarily in reaction to crises, but should be the locus of integrated, proactive water management. This approach to infrastructure management, which calls for planning and managing water infrastructure in tandem with land use, economic development, housing and sustainability strategies, calls for new water utility management styles that reflect and enhance New Jersey communities more broadly. The US Water Alliance has developed a roadmap for such integrative thinking that is called "One Water Management" within the water sector.

This sort of collaborative and integrated planning is already taking place in New Jersey. For example, the City of Hoboken, in partnership with the North Hudson Sewerage Authority and private developers, is investing in green infrastructure. Following Hurricane Sandy, the city developed a framework for green infrastructure on both a citywide and neighborhood basis that identifies the

Hoboken's new Southwest Park employs green infrastructure to reduce flooding, provide much-needed park space and support green jobs training.

most cost-effective, place-based green infrastructure best management practices for Hoboken. The city utilized the state's low-cost State Revolving Fund Financing Program (the New Jersey Environmental Infrastructure Financing Program or NJEIFP) to acquire land for more than eight acres of resiliency parks, including Southwest Park, New Jersey's first resiliency park, which opened in September 2017. Repurposing these lands as parks with green infrastructure and underground stormwater detention will increase the city's areas for open space and recreation while mitigating rainfall flooding. In partnership with the Hoboken Housing Authority and Cities of Service, the city is also providing green jobs training in green infrastructure installation and maintenance for low-income residents.

Another example of smart reinvestment can be found in the Borough of Seaside Park on Barnegat Island, which also used low-cost loans from the NJEIFP (plus funding from the U.S. Department of Agriculture) to replace sewer lines and water mains as part of its asset management initiative. This infrastructure project has improved the sewer collection systems, prevented seawater infiltration into sewer lines, and reduced water leakage and loss. As a result, Seaside Park is saving more in annual sewage treatment costs than the cost of the project's annual debt service, and is also saving on water supply costs.

Progressive solutions to water infrastructure issues are also in place in Ridgewood, where a coalition of public and private partners upgraded a water pollution control plant to incorporate green technologies, including solar panels and a new biogas-fueled generator that can convert methane gas to electricity. The four solar installations located throughout the Village of Ridgewood provide not only 100 percent of the electricity needed to operate the water pollution control plant but also generate revenue. With reduced operational costs, financing was done at no additional cost to the community.

Coordinating water systems with other city and state capital and operating priorities encourages a greater holistic change in the outcomes for communities. Isolating water infrastructure as a standalone problem discourages seeing water infrastructure as an integrated piece of such broader goals as sustainability, inclusion, diversity and equity.

Green infrastructure exemplifies the integrated approach. For example, incorporating green infrastructure into a schoolyard improves the quality of the schoolyard with added shade and beautification while capturing stormwater. Street trees and green roofs mitigate the urban heat island effect while also capturing stormwater. Moreover, these measures can also tap into funding sources traditionally limited to parks and transportation. **By establishing local stormwater utilities and development requirements, communities can drive the use of green infrastructure through stormwater fees and credits, and incentives or grants for green infrastructure retrofits. Stormwater utilities are currently authorized in 39 states, but not in New Jersey. This needs to change.**

PART FIVE

STRATEGIC OPTIONS AND BEST PATHWAYS TO HEALTHY WATER INFRASTRUCTURE

A resilient and sustainable New Jersey depends upon its ability to provide reliable, high-quality drinking water, and to maintain and improve upon its wastewater and stormwater infrastructure. Yet from the national dialogue on infrastructure needs in the transportation, water, and energy sectors, it is clear that:

(1) There are significant needs both locally and nationally for infrastructure renewal;

(2) New technologies and materials that reduce costs, improve performance, and increase sustainability and water security (e.g., resource recovery and renewable energy facilities, advanced water treatment systems, "smart" advanced metering systems) are gaining widespread use and acceptance across the globe;

(3) In too many water utilities there is insufficient available financial capacity for capital infrastructure funding beyond certain critical repairs and renewals;

(4) There are some significant new public and private funding sources for infrastructure, but much more is needed if we are to create water systems that will support our long-term goals of creating resilient and sustainable communities.

The condition of New Jersey's water infrastructure is similar to conditions found throughout the United States — that is to say, it varies from excellently managed and operated water systems that are resilient and sustainable, to water systems that are functional but highly vulnerable to acute or chronic failure. Every community needs to appreciate its infrastructure vulnerabilities and get to work making its water systems stronger. This may involve improved capital planning and asset management; investing in new technologies, green infrastructure or data management systems; finding new sources of revenue or creating efficiencies that reduce costs; identifying community co-benefits to leverage water infrastructure investments; and ensuring that sufficient local rate revenues are generated while preserving affordable service for all.

As with any multi-faceted challenge, there is no "silver bullet" to fix everything. Instead we must explore a mosaic of solutions. Here are some of the more important and interesting directions in which the water industry is moving on a national scale, some of which were spearheaded by innovative water systems in New Jersey:

(1) Federal and State Role in Funding Water Infrastructure

Since the 1980s, the federal share of funding local water and wastewater infrastructure projects has been relatively stagnant, representing 5 percent to 10 percent of the total water system expenditures.[3] While much more needs to be done, this level of funding is not insignificant and needs to be leveraged locally as much as possible.

The NJEIFP provides low-cost financing for the construction of water infrastructure projects. The NJEIFP leverages federal funding it receives through the Clean Water and the Drinking Water State Revolving Funds. To date, over $4.3 billion in low-interest loans have been provided to public and private water entities in the state, with an estimated savings to ratepayers of $1.8 billion. This has been a tremendous good-news story for New Jersey's water infrastructure, but more is needed.

For New Jersey, support for increased spending for water infrastructure investment is critical, and keeping water affordable is essential, especially for its low-income residents; providing assistance will be necessary in instances where customers are unable to pay. We must therefore all work together not only to ensure that New Jersey continues to receive its fair share of Clean Water and the Drinking Water State Revolving Funds, but to work with

our national partners to increase the federal government's total level of investment in water infrastructure, including new grant funding in addition to loans.

Similarly, federal support is essential for the areas where future expenditures of public funds in the water sector will be needed most: the removal of lead service lines; the elimination of sewer overflows; making New Jersey resilient to extreme storms; and retraining workers to support the growing need for operational, engineering, technical, and administrative expertise in the water field. The U.S. Environmental Protection Agency (USEPA) recently opened a new office called the Water Infrastructure and Resiliency Finance Center, which provides support and serves as a clearinghouse for information on water infrastructure financing alternatives and best practices.

The Water Infrastructure Finance and Innovation Act (WIFIA) is a new funding vehicle for federal low-interest loans. The stated purpose of WIFIA is to "accelerate investment in our nation's water and wastewater infrastructure by providing long-term, low-cost supplemental credit assistance under customized terms to creditworthy water and wastewater projects of national and regional significance." No New Jersey entities sent a letter of inquiry to this program, though the most recent cycle resulted in more than $2 billion in loans. The WIFIA program offers a potentially significant new funding source for New Jersey water systems.

To New Jersey's north, New York State recently passed the 2017 Clean Water Infrastructure Act, which provides $2.5 billion in state grants to rebuild septic systems, stop sewage leaks and overflows, protect drinking water resources, and for other local infrastructure projects that address the state's priority water issues. Over $1.5 billion of these funds are for grants for water infrastructure improvements. Another $75 million are for a rebate program for homeowners and small businesses to replace or upgrade aging septic systems. Funds are also available for green stormwater infrastructure, source water protection initiatives (including land acquisition), a $300 million Environmental Protection Fund, and many other projects and programs related to water infrastructure improvements.

"Integrated planning allows communities and regulatory agencies, with meaningful input from members of the public, to meet multiple Clean Water Act requirements by identifying efficiencies and prioritizing investments, to ensure the most serious public health and environmental protection issues are addressed first.

2) USEPA Role in Supporting Integrated Planning and Compliance Assistance

One new form of partnership that is taking shape at the USEPA is the concept of integrated planning. Integrated planning allows communities and regulatory agencies, with meaningful input from members of the public, to meet multiple Clean Water Act requirements by identifying efficiencies and prioritizing investments, to ensure the most serious public health and environmental protection issues are addressed first. Integrated planning includes development of effective financing strategies and can facilitate improved asset management and the use of sustainable solutions like green infrastructure. The USEPA, NJDEP, municipalities, and wastewater utilities can work together to use this approach.

Federal support, funding and guidance from the USEPA are also needed to enhance the opportunities for public-public and public-private partnerships in our state, especially for regional water supply interconnections, the restoration of our rivers and streams and wetlands, and peer-to-peer

support. Perhaps most importantly, the USEPA (along with NJDEP) should use its regulatory oversight both to provide compliance assistance for our water systems and to bring enforcement actions when necessary to ensure compliance. In addition, where compliance costs require new local utility revenues for capital investment and a segment of the population served would be significantly adversely affected by rate increases, it is in everyone's interest to prioritize among multiple compliance needs and to provide assistance to low-income customers so that rate increases do not impose an undue burden on those least able to pay. Together with federal and state funding for water infrastructure, these strategies are key to making clean water available and affordable.

(3) Community Partnerships

Utilities across the country are seeking long-term affiliations with their customers and neighborhood groups to understand community priorities more completely and leverage the power of partnerships more effectively. Utilities are acting as community anchor institutions, leveraging the opportunities to work with communities for co-benefits and providing leveraged funding from multiple sources. For water infrastructure work — whether green infrastructure such as stormwater tree systems along streets, or grey infrastructure such as the rebuilding of water and sewer pipes — by partnering with the community, utilities are strengthening the sense of place and the livability and sustainability of the area, and are able to leverage multiple goals and benefits. The CCMUA, Seattle Public Utilities and the San Francisco Public Utility Board are three national models supporting partnerships that place a high value on authentic stakeholder engagement and local inclusion in decision making, and jobs training.

In San Francisco, the San Francisco Public Utilities Commission (SFPUC) has a strong community benefits program that seeks to prioritize equity, sustainability and environmental justice throughout its operating and capital programs. For example, all contractors proposing on large projects (greater than $5 million) are encouraged to support positive community impact by working with community partners and the SFPUC to adopt schools, build community gardens and playgrounds, and invest in work readiness programs. Proposals from contractors that include such community investments are given extra weight in the selection process. To date, firms have benefited dozens of organizations and hundreds of residents without cost to the SFPUC or its customers.

Closer to home, the CCMUA is working with the Camden Collaborative Initiative to put neighborhoods and the environment at the center of cross-sector partnerships. Since 2013, they have been facilitating and leveraging partnerships for proactive, holistic, and innovative solutions to help Camden become a vibrant sustainable city by maintaining, restoring, and enhancing its environmental resources.

(4) Affordable Water and Equity

How do we fund critical infrastructure work without water rates becoming unaffordable to a portion of the community? Organizations across the water industry and utility sector, academia, and the nonprofit sector are spearheading innovative thinking about how to ensure that everyone has affordable access to clean, safe and efficient water, wastewater, and stormwater service.

For the past decade, water and sewer bills have increased faster than both inflation and household income growth, especially for the urban and rural disadvantaged. This has had two effects: (1) More low-income households are making choices between paying rising water bills or paying for other life essentials, and (2) municipalities can find it difficult to muster the political will to raise revenues to fund infrastructure because of the detrimental effect higher rates can have on low-income families.

In some places, utilities use customer assistance programs to help low-income families afford their water utility bills. For example, New Jersey American Water offers the H2O (Help to Others) program, which provides low-income customers one-time grants of up to $500 to

avoid shutoffs or restore service after a shutoff, as well as other selected reductions in their monthly charges. These programs are beneficial but, at present, are generally insufficient to meet the scale of the need. Even with these interventions, many households continue to fall behind in their payments, which can lead to water shutoffs and, eventually, liens on their properties.

The Philadelphia Water Department has pioneered a new low-income program that reduces the water, wastewater, and stormwater bill to as low as $15 per month for households at or below 50 percent of the federal poverty level. The objective is to prevent the thousands of households unable to pay their water bills from falling further and further behind. Despite the reduced cost to households, it is anticipated that the revenue from this new program will be greater than previously achieved, as more low-income families pay something towards their water bill each month, rather than nothing. It is also hoped that providing relief to economically disadvantaged customers will ease some of the pressure to keep water rates artificially low.

> ***"Today, 90 to 95 percent of all revenues required for the capital and operating expenses for our water systems comes directly from utility customers.***

(5) Municipal Investment Incentives

New financial models are needed to create an incentive for infrastructure investment by publicly-owned water utilities. The federal Construction Grants Program for financing the design and building of regional wastewater treatment facilities in the 1970s and 1980s led to significant progress in the restoration of many of our nation's lakes and waterways. Grants of up to 85 percent of total capital costs facilitated the design and construction of many regional wastewater treatment systems. Since that time, there has been a steadily growing reliance on local revenues rather than federal funds to finance all water and wastewater infrastructure improvements. Today, 90 to 95 percent of all revenues required for the capital and operating expenses for our water systems comes directly from utility customers.[4] As the water industry moves to newer technologies and we reach the end of the life cycle of our existing infrastructure, finding new resources to help pay for the next generation of treatment becomes critical.

Without significant new sources of federal funding, revenue generation (needed for access to capital for infrastructure investments) will fall squarely on the ratepayer. For many municipal systems, history tells us that there is not enough incentive for mayors and utility managers to raise water rates to levels needed for sustainable long-term operations. This must change.

In addition, many local officials and capital planners focus almost exclusively on the annual cost of financing capital upgrades without taking into consideration the full beneficial effect and savings of a long-term investment in their water systems (e.g., budgetary savings from fewer emergency repairs, more efficient equipment costing less to operate or repair, lower overtime charges, lower energy and chemical costs). If these direct savings were calculated into a project's net cost, decision makers would be surprised at how much less costly, or how much more affordable, many projects previously considered too expensive actually are. In general, utilities across the country need to plan across longer timeframes, though this is made difficult when crises, repairs, and maintenance account for large amounts of the budget.

The model used by the New Jersey Board of Public Utilities (BPU) for private water companies (which provide drinking water to about 40 percent of New Jersey's population) requires that rates be set at levels that "ensure safe, adequate, and proper utility services at reasonable rates for customers ..." Utilities regulated by the BPU have a better track record of strong asset management and well-funded capital programs. Part

of the reason that BPU-regulated utilities are more successful in achieving these results is the culture among the private water companies, and part is that they are somewhat outside the local politics of rate-setting. In addition, private water systems in many states, including New Jersey, have gained the ability to add a billing surcharge for distribution system improvements (DSIC). However, the BPU does not regulate government-owned water systems in New Jersey, which means local authorities have considerable influence over water rates. As noted previously, there do not seem to be the motivation, political will or proper incentives to fund municipal water infrastructure investments to the extent required. There could be some level of progress moving forward for public utilities with the ability to add both a DSIC-like surcharge to help pay for infrastructure needs and some form of additional incentive for investments. Perhaps the recently passed Water Quality Accountability Act requirements for public water systems to conduct asset management programs may help provide publicly-owned utilities with some of the "incentive" (or oversight, or mandate) that BPU provides for private utilities to invest appropriately.

(6) Asset Management and the New Jersey Water Quality Accountability Act

Given the general aging of much of the U.S. water infrastructure and the potential for water system failures that may result, asset management and capital investment have become among the most critical areas for water utility managers to balance when planning and prioritizing their capital improvement programs. Asset management begins with identifying and categorizing pipes, equipment, processes, and facilities, preferably on a geographic information system (GIS) that allows for weighting of attributes across various spatial scales. This is followed quickly by an assessment of the condition of these capital assets and the use of computer applications that balance the risk and costs of failure against the costs of replacement and renewal to determine the most urgent or highest-return repair or upgrade needs. At the same time, facility, financial, strategic, and business plans need to be developed to fund the asset management program and to determine the size, capacity, technology, and lifecycle cost of alternatives for replacement. In larger utilities, this is typically performed by a capital asset manager along with a team of engineers; for medium and small utilities, is a function that is contracted out to a consulting engineering firm. Due to the costs and expertise needed to perform these assessments and the funding needed for the prioritized projects, some utilities have been able to manage, until now, without an aggressive asset management program by relying on the strength of the original infrastructure network.

"The state of New Jersey has taken a giant, nation-leading critical step toward requiring asset management for its water systems. The New Jersey Water Quality Accountability Act represents a major change in the role of New Jersey state government in ensuring the reliability, resiliency and sustainability of the state's drinking water infrastructure.

The state of New Jersey has taken a giant, nation-leading, critical step toward requiring asset management for its water systems. The New Jersey Water Quality Accountability Act represents a major change in the role of New Jersey state government in ensuring the reliability, resiliency and sustainability of the state's drinking water infrastructure. (The WQAA is limited to the 300 community drinking water systems in the state that serve more than 500 customers, but these systems serve the vast majority of all customers statewide.) The WQAA, which became effective in October 2017 and is to be enforced by the NJDEP, requires, among other things, that water systems "create and implement an asset management plan designed to inspect, maintain, repair, and renew its infrastructure consistent with

> *It is vital that water utilities have the funding available to invest in new technologies so they can reap the benefits of greater efficiency, improved service and water quality, and reduced costs.*

standards established by the American Water Works Association."[5] This represents a new and highly innovative strategy that requires water systems to implement asset management best practices such as condition assessments; asset risk forecasting (to address future conditions such as severe storms); and establishment of sound funding strategies for asset management and system improvements. Because the WQAA itself does not specify the required elements of asset management, or the level of scrutiny the state will give to utilities' asset management plans, it will be crucial for the NJDEP to develop and implement effective regulations and guidelines under the act.

Further, the WQAA covers only drinking water utilities, and creates no asset management requirements for wastewater or stormwater infrastructure; additional policy development is needed to address asset management in those systems.

(7) Investments in Smart and Renewable Water Systems

In addition to simply replacing aging infrastructure with newer pipes and facilities, investing in new technologies and approaches to managing our water systems can save significant operating expenses. For example, the water industry relies on information — for water quality, real-time process controls, capital planning, metering and billing, and even customer services. It is vital that water utilities have the funding available to invest in new technologies so they can reap the benefits of greater efficiency, improved service and water quality, and reduced costs. These new technologies are not inexpensive and may seem like an unaffordable luxury to a system dealing with aging infrastructure and rising costs, but they are essential to reducing risks of failures, prioritizing investments, and collecting and recording revenues accurately. The water industry has been very slow to adopt these new technologies, and one of the important reasons for this has been in the priority setting for how to spend limited infrastructure dollars.

In another example of spending money to save money, wastewater utilities across the United States and in New Jersey are now modifying their treatment processes to take advantage of all the resources contained in the waste — thermal energy, nutrients, methane gas, and even the water itself. For example, although wastewater treatment is an extremely energy-intensive process, wastewater contains five times the amount of energy required to operate the treatment process.[6] Most of this is in the form of thermal energy, which can now be recovered and used for heating and cooling. This thermal energy can be used at or near the treatment

The Landis Sewerage Authority exemplifies a "One Water" approach that marries technologies that extract energy from the wastewater treatment process with groundwater recharge, habitat restoration, and farming and forestry.

facility, or taken from sewers through heat exchangers to provide heating and cooling for downtown office buildings. Wastewater treatment also produces significant levels of methane gas, which can be used in co-generators, where the methane can power engines that generate electricity and heat. Nutrients can also be recovered from the wastewater process and, perhaps most importantly, we can now treat the wastewater sufficiently to reuse it for groundwater replenishment, agriculture, and even drinking water. The goal is to recover all of the ingredients in the wastewater, become energy independent or a net generator of energy, and reduce the levels of greenhouse gases released to the atmosphere. As with the development of any new technology, these systems can be expensive to implement, but will pay dividends back to the residents of New Jersey.

(8) Regional Stormwater Utilities

Urban stormwater runoff is not only one of the most significant threats to our water environments today, but also represents the source of some of our greatest water infrastructure challenges. Yet communities in New Jersey have no "utility" that is directly responsible for managing stormwater, and the costs for doing so often lie hidden in property taxes and wastewater tariffs. This is not to suggest that there are no NJDEP requirements for communities regarding stormwater management, but the obligation falls on the municipality, and with no "utility" structure, there is no entity or institution to fund or implement those obligations effectively.

The NJDEP has been very vocal in its concern about stormwater runoff, also called nonpoint source (NPS) pollution. It has supported the Clean Water Council in its recent public hearing focused on NPS pollution, and recognizes that it is the nation's largest water quality problem, causing impairment of approximately 40 percent of the country's surveyed rivers, lakes, and estuaries.[7]

A stormwater utility not only supports activities that improve existing infrastructure and reduce flooding but also works to support new construction, including green stormwater infrastructure like this "green street" in Philadelphia.

Municipalities around the country are reorganizing their public works and water/sewer departments to create a stormwater utility responsible for stormwater management and to give it the authority to collect parcel-based fees as its source of funding. These fees are determined based on GIS analysis of a municipality's public and private parcels, roads, and parks to determine each one's gross area and its percent of impervious area, which is then used to determine the amount of stormwater that a property or site sends to the street or the sewer system. Stormwater utility fees establish a value for the stormwater, allowing credits and grants to be provided for property owners, cities and nonprofits that manage their land in ways that handle stormwater more effectively. Using GSI management techniques, utilities can support flood management, ecosystem improvements, CSO controls, and livability.

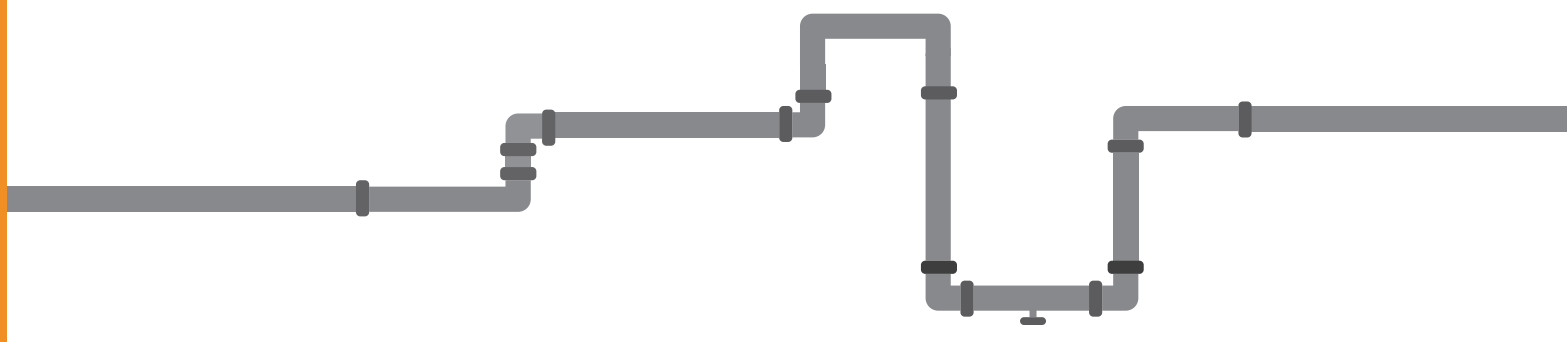
(9) Alternative Water Infrastructure Project Delivery Models

There are some unique public-private partnerships in New Jersey that have demonstrated the potential for alternative approaches for communities that want to finance solutions to their infrastructure challenges. The City of Elizabeth, for example, entered into long-term contracts with American Water to maintain and operate the city's water and wastewater systems, which has resulted in multiple benefits to the city and its residents, including an upfront payment of $60 million to the city, upgraded water infrastructure, and a city government that is able to focus on other priorities rather than the issues related to the operations of an aging water and wastewater system. The City of Bayonne entered into a long-term concession agreement with SUEZ (formerly United Water) under which SUEZ agreed to an upfront payment to the city of $176 million and provided assurances that Bayonne's water and wastewater system will see sufficient investment over the 40-year life of the contract.

The success of these financing and operating partnerships depends heavily on high-level expertise on the municipal side, to ensure that the partnership is built on mutual benefit and fosters mutual trust, and to be able to offer transparent evidence that the approach works. For a successful partnership, both entities' financial interests must be properly aligned and the risks appropriately shared.

In another form of water infrastructure financing, six community banks in the State of Kentucky recently joined to launch the Commonwealth Infrastructure Fund. With initial available capital of $150 million, the fund is designed to provide debt financing to private-sector companies to encourage public-private partnerships in state and local infrastructure projects. Although not limited to water and sewer projects, it represents another opportunity to encourage creative financing where monies may not otherwise be available.

Nationally, utilities have traditionally engaged design engineers to design water infrastructure facilities, and then put out for public bid the facility's construction. The facility would then be operated by the public utility. This process, called design-bid-build (DBB), is still used today by many utilities, but can result in inefficiencies resulting from disagreements among the designer, the builder and the operator. Newer, less traditional methods of project delivery include design-build and construction manager-at-risk, which may result in lower cost, faster schedules, and higher quality. The differences between these methods are still being studied by various entities, most notably the Water Research Foundation.[8]



PART SIX
LEADERSHIP

As these innovative approaches demonstrate, improving New Jersey's water infrastructure is not an unsolvable problem, but one that requires strong leadership. Leadership distinguishes those utilities that invest in new infrastructure and technologies from those that shy away from these challenges. It's what has enabled some utilities to optimize capital investments, improve customer service, and reduce operating costs.

One approach to creating a cycle of continuous improvement that engages myriad stakeholders is Effective Utility Management (EUM). The program is recognized by the USEPA and many of the professional organizations of the water and wastewater industry as a helpful guide for assessing operations comprehensively and identifying a path toward effective and sustainable operations. Effective Utility Management provides an approach for water utility managers to conduct organizational assessments in up to 10 critical management areas: product quality, customer satisfaction, employee and leadership development, operational optimization, financial viability, infrastructure strategy and performance, enterprise resiliency, community sustainability, water resource sustainability, and stakeholder understanding and support. The Philadelphia Water Department used EUM's 10 attributes to form the basis of a strategic plan that included improving its financial health, protecting and investing in its infrastructure, and ensuring sustainable utility operations. Effective Utility Management is designed to be flexible and useful for any size utility no matter its infrastructure condition, governance, or management style.

But leadership within utilities is not enough to produce the kind of transformation our communities need. **As successful water infrastructure projects in New Jersey and around the country have illustrated, stakeholders from public, private, and civic groups need to strategize together for a shared future. These alliances can only be formed, and will only be meaningful, once they share a vision for water infrastructure that transforms the social, economic and environmental quality of our cities and towns.** The Jersey Water Works collaborative exemplifies this approach, where individuals and organizations from all perspectives have come together to advance a common agenda for sustainable, cost-effective water infrastructure projects that benefit host communities.

> ***Leadership distinguishes those utilities that invest in new infrastructure and technologies from those that shy away from these challenges. It's what has enabled some utilities to optimize capital investments, improve customer service, and reduce operating costs.***

As more projects like the resiliency parks in Hoboken, the energy solutions in Ridgewood, and the capital investments in Seaside Park and Camden illustrate, modern water infrastructure investment is integral to pursuing resilience, sustainability and inclusiveness for the townships and cities of New Jersey and across the United States. **But underpinning that vision must be an education campaign that ensures both the public and its representatives understand what is at stake. Much is riding on the success of this collective understanding. In New Jersey and across America, it's about nothing less than the livability of our communities.**

The urgency of the challenge to repair the state's inadequate water infrastructure requires an even more focused approach and greater emphasis on action than the collaborative has employed to date. The Jersey Water Works priority solutions provide everyone in the sector with the next steps critical to our continued progress.

JERSEY WATER WORKS:
Solutions That Form Our Action Agenda

AS DETAILED IN THE PRECEDING ESSAY, *Transforming New Jersey's Water Infrastructure: A Call to Action and Innovation*, we face an enormous water infrastructure problem in New Jersey and across the country. In order to achieve better outcomes, Neukrug and Lind argue that we must rethink how we manage, design and rebuild our water systems with a new vision that can transform not only the water sector, but the future landscape of our cities and towns. Their essay lays out a broad set of strategic options that can move communities to a sustainable water future.

How to get started? States often act as laboratories to solve national problems. **Engaging stakeholders from all perspectives — from consumers and community advocates to utilities leadership and policy makers, to environmentalists and academics — the Jersey Water Works collaborative has taken the lead in identifying steps New Jersey can take to improve its water infrastructure dramatically.**

JERSEY WATER WORKS PRIORITY SOLUTIONS

Since its inception in 2015 as a strong collaborative directed by the consensus of its diverse membership, Jersey Water

Jersey Water Works Priority Solutions for 2020

Laying the groundwork for wide-scale transformation of our water infrastructure systems.

1 INCENTIVIZE AND REQUIRE ASSET MANAGEMENT PROGRAMS

Immediate Priorities:

- Require asset management programs with phased implementation for drinking water, wastewater, and stormwater systems, including through capital improvement plans and funding.
- Authorize stormwater utilities and stormwater fees.

Longer Term Solutions:

- Provide more state matching grants.
- Build capacity of small and poor performing utilities, including through peer-to-peer networks.

2 EDUCATE THE PUBLIC AND ELECTED AND APPOINTED OFFICIALS

Immediate Priorities:

- Raise awareness among the public and elected and appointed officials of the importance of taking care of water infrastructure.
- Educate on the costs of inaction, i.e. of not doing asset management and on the potential loss of community benefits.
- Require utilities to provide, and state agencies to collect and publish, simple metrics of system condition and utility finances.

Longer Term Solutions:

- Require training for utility boards and local officials.
- Require utilities to integrate the community master plan and redevelopment vision, as well as focused community input, into their asset management program.

3 SUPPORT AND SHAPE EXISTING AND NEW GOVERNMENT FUNDING INITIATIVES

Immediate Priorities:

- Support and shape new state funding for water programs that advance Jersey Water Works goals.
- Communicate importance of federal State Revolving Fund and U.S. Department of Agriculture financing programs.

Note: *The participation of state and federal government members of the Steering Committee does not constitute individual or organizational endorsement of any of the recommendations presented here, especially regarding new funding or legislation.*

Works has focused on identifying realistic solutions to achieve system change.

In 2017, in a rigorous process undertaken by the Jersey Water Works Steering Committee, the new priority solutions were developed and adopted. This approach launches Jersey Water Works on the next phase of its work in a direction consistent with the visionary reforms laid out by Neukrug and Lind.

HOW DID THE COLLABORATIVE DETERMINE THESE PRIORITIES?

The more than 350 individuals who belong to the Jersey Water Works collaborative, and the numerous thought leaders who devote time and expertise to its committees, are united by their efforts to achieve healthy, resilient communities with the modern water infrastructure that they need to thrive.

Together in 2015 they agreed on four over-arching goals, noted here, and 12 sub-goals:

EFFECTIVE GREEN AND GRAY INFRASTRUCTURE

SMART COMBINED SEWER-OVERFLOW CONTROL PLANS

FINANCIALLY SUSTAINABLE SYSTEMS

EMPOWERED STAKEHOLDERS

But the urgency of the challenge to repair the state's inadequate water infrastructure requires an even more focused approach and greater emphasis on action. It became clear that the collaborative needed to understand more clearly the obstacles to its goals, so it could focus its efforts on the solutions most likely to overcome them.

Working together through a strategic planning process, Jersey Water Works members identified the two most significant obstacles impeding progress towards the collaborative's shared goals: the lack of adequate financing and the lack of robust asset management.

In early 2017 the Steering Committee kicked off a comprehensive strategic planning process that identified two key obstacles to progress: lack of adequate financing and lack of robust asset management. Then, in a true collaborative effort, small working groups and New Jersey Future staff generated detailed background papers and proposed solutions for the Steering Committee to consider. Their consensus is reflected in the priority solutions. (All background papers are available in the online Appendix to this report, including possible solutions that were not selected as top priorities.)

At a recent strategic planning retreat, Steering Committee members reviewed possible solutions and identified those most likely to precipitate change.

WHO WILL TRANSFORM NEW JERSEY'S WATER SYSTEMS?

Jersey Water Works will work to catalyze system-wide change, recognizing that coordinated efforts across agency, sector and political boundaries will be needed to implement these priority solutions in order to advance the full-scale transformation our water infrastructure systems. Implementation will require changes in state policy, utility practice and local government decision making.

For Jersey Water Works and its members, the collaborative's goals and sub-goals remain in place, and the priority solutions will focus the collaborative's activities through 2020 to achieve those goals. The Jersey Water Works Steering Committee will provide overall direction on the development of implementation plans for each of the priority solutions. With this guidance, the collaborative's committees will craft their annual work plans in early 2018 to help advance the priority solutions. Backbone staff from New Jersey Future will support the committees' work and measure progress.

"The responsibility for transforming New Jersey's water systems falls to us all,"

— Mark Mauriello, Edgewood Properties, Co-Chair, Jersey Water Works

But transforming our water systems will require much more than the committee's work. Jersey Water Works members will be asked to integrate the priority solutions into their own organizations' activities. And every actor in the state's water systems, whether members of Jersey Water Works or not, should do the same for maximum effect.

Fortunately, a new governor is preparing to lead, which creates new opportunities. We are optimistic that this report makes the case to upgrade our water systems and conveys the power and potential of the Jersey Water Works collaborative.

PRIORITY SOLUTION 1:

Incentivize and require asset management programs

Asset management costs money; however, Jersey Water Works case studies show how smart capital investments actually save money long-term. For example, the Camden County Municipal Utilities Authority has, since 1997, replaced virtually all of its primary treatment assets, using grants and low-interest loans from the New Jersey Environmental Infrastructure Financing Program. As a result, CCMUA rates are now considerably lower, on an inflation-adjusted basis, than in 1996, while nationally water and sewer rates have increased at a faster rate than the Consumer Price Index during the same period.

WHAT IS ASSET MANAGEMENT?

Asset management is the systematic approach that drinking water and wastewater utilities use so they can deliver the optimum level of service at the lowest possible lifetime cost. In simplest form, asset management is similar to preventative health care — getting regular check-ups and following your doctor's advice to stay healthy and minimize expensive medical procedures. Much like ignoring early warning signs of heart disease, ignoring underground water pipes and deferring maintenance endangers critical services.

Through asset management, well-trained personnel identify and repair or replace structurally deficient equipment — the system's assets — on a proactive basis, prior to a catastrophic failure. By taking this approach, utilities can plan operating and capital budgets to ensure that annual revenue and reinvestment are sufficient to support the system's long-term viability. Asset management facilitates considering a project's social and environmental impact and provides customers with expected levels of service at the lowest possible lifetime cost.

THE UNFORTUNATE STATUS OF ASSET MANAGEMENT EFFORTS

Many utilities have long managed their assets on a reactive, or at best informal, basis, making our water infrastructure extremely vulnerable to the complex challenges ahead, as detailed in the previous chapter. Local utilities may not know all the details about the condition of their water systems — whether they are improving or declining, or the cost to upgrade and manage them effectively. **Despite recent progress, effective asset management has not become an established, routine, expected function of many water supply and wastewater utilities.** (A more complete list of the implications of lack of robust asset management programs, as well as supporting materials, can be found in the background report in the Appendix.)

Asset management programs lay the groundwork for prioritized, systematic upgrades to water treatment plants, like the Camden County Municipal Utilities Authority plant shown here, that keep water utilities running well and at the lowest lifecycle cost.

JERSEY WATER WORKS PRIORITY SOLUTIONS FOR ASSET MANAGEMENT

Jersey Water Works' priority solutions for asset management include four approaches that recognize the substantial resources needed to implement such programs completely.

Immediate Priorities for Asset Management:

- **Require asset management programs with phased implementation, including through capital improvement plans and funding, for drinking water, wastewater, and stormwater systems.** In 2017, the governor signed the Water Quality Accountability Act, a law requiring all but the smallest drinking-water purveyors to implement asset management plans designed to inspect, maintain, repair and renew their infrastructure and to dedicate funds annually to complete the highest-priority projects. Implementing the act now falls to state agencies, which must define requirements for compliance.

  The act has great potential to jump-start the adoption of asset management as a standard practice for drinking water utilities and position New Jersey as a national leader. **Jersey Water Works members are partnering with industry and municipal leaders to prepare recommendations for state agencies to help ensure effective implementation.**

  Wastewater systems are not required by statute to implement asset management programs at this time, with the exception of the 25 cities and utilities with operating permits for combined-sewer systems. Jersey Water Works committees will consider ways to require and/or incentivize asset management for this sector.

Despite recent progress, effective asset management has not become an established, routine, expected function of many water supply and wastewater utilities.

- **Authorize stormwater utilities and stormwater fees.** Unlike 39 other states, New Jersey does not have any utilities dedicated to managing stormwater systems. Here, stormwater infrastructure is typically managed by municipal departments of public works, without a dedicated funding stream. Some statutory authority for stormwater utilities already exists and legislation explicitly authorizing stormwater utilities and a dedicated funding stream is expected to be introduced in 2018. Although the collaborative does not take positions on legislation or regulations, many Jersey Water Works members will support this legislative initiative as a first step to facilitating the management of stormwater assets.

Representatives from CSO utilities and municipalities gather as part of a Jersey Water Works peer-to-peer network to compare notes on mitigating combined sewer overflows and explore best practices.

Longer-term Solutions for Asset Management:

- **Provide more state matching grants.** This longer-term priority solution recommends providing more state matching grants, perhaps building on the fledgling NJEIFP technical assistance funding, to help utilities afford better asset management programs.

- **Build the capacity of small and poorly performing utilities, including through peer-to-peer networks.** Developing proactive asset management programs is a big job. It is especially difficult for smaller water and sewer utilities and for those in economically stressed areas to devote the necessary resources. Jersey Water Works prioritizes finding ways to ensure all utilities have the capacity to embrace asset management, including through a peer-to-peer support network to share expertise and best practices.

PRIORITY SOLUTION 2:

Educate the public and elected and appointed officials

Water infrastructure is invisible. Consumers have come to take for granted the basic functions of effective water service — ready availability of clean, safe, affordable drinking water, efficient removal of wastewater, and effective management of stormwater. But when water infrastructure fails, whether through a water or sewer main break, local flooding, sewage backup or other disruption, it is a crisis. Education can "unearth" water infrastructure for consumers and officials.

Polling shows that people do care about the state of their water infrastructure, and are willing to pay more to ensure its reliability, especially when they are educated about it:

- 91 percent of New Jerseyans prioritized protecting the drinking water supply, which outranked nine other issues including improving education and reducing property taxes. *(Monmouth University Polling Institute, 2011)*
- 71 percent of Americans deemed it very important to improve and modernize the water infrastructure system, after being asked their assessment of the country's and their local water infrastructure. *(Value of Water Survey, 2016)*
- Elected officials agree: In 2015 U.S. mayors reported that infrastructure, including water infrastructure, is the most pressing issue they face, and should be addressed at the state or federal level. *(Menino Survey of Mayors, 2015)*

Hackensack Mayor John P. Labrosse noted at the Jersey Water Works communications kick-off meeting on Sept. 26, "Participation and investment begin with public awareness."

91 percent of New Jerseyans prioritized protecting the drinking water supply, which outranked nine other issues including improving education and reducing property taxes.

Because water infrastructure has been an "invisible benefit" for so long, few water and sewer utilities have developed the capacity for effective public outreach. **Now they need strong communications to make the case for investment in water infrastructure more understandable to both constituents and officials.** In 2015 and 2016, three New Jersey mayors hosted meetings to kick off peer-to-peer assistance from DC Water to combined-sewer utilities that are required to do robust public outreach as part of their new operating permits. DC Water provided communications workshops and one-on-one consulting.

JERSEY WATER WORKS PRIORITY SOLUTIONS FOR EDUCATION

Jersey Water Works' priority solutions for stakeholder education include five approaches.

Immediate Priorities for Education:

- **Raise awareness among the public and elected and appointed officials of the importance of taking care of water infrastructure.** Transforming our water systems depends upon knowledgeable elected and appointed officials who will in turn look to their constituents for support. How can awareness be raised? Elected leaders can be effective spokespeople for clean water. Governors often spearhead public awareness campaigns on signature issues that they promote directly to the public. Consider, for example, Governor Whitman's "million-acre" open space campaign and Jersey City Mayor Fulop's 2017 "Year of Water."

  New Jersey's Joint Legislative Task Force on Drinking Water Infrastructure has elevated the issue through public hearings and press coverage, and will amplify this outreach when it releases its recommendations. Local water utilities have an array of tools that they can use, including public-facing program names and logos, high-profile ribbon-cuttings featuring elected officials, a visible presence at community events, social media campaigns, and direct outreach to ratepayers.

- **Educate on the costs of inaction; i.e., of not doing asset management, and on the potential loss of community benefits.** State and local education campaigns need to demonstrate to the public and elected officials the costs of deferring maintenance. For example:

  - Residents and business owners need to see the connection between poorly maintained water mains and the breaks that disrupt schedules and business operations.

  - Users of recreational waterways need to know when there is so much sewage pollution that they must stay on land.

Events like the Atlantic County Utilities Authority's annual Earth Day festival give community members a fun way to learn about the importance of clean water.

  - Results of testing of school facilities for lead in drinking water need to be aggregated and reported at the state level.

  - Local reporters need to understand these issues better and cover them more.

  - Utilities need to provide, and state agencies to collect and publish, simple metrics of system condition and utility finances.

  Understandably, customers want to know how their systems are doing. Are things improving or getting worse? How much water is lost through leaks? How many water main breaks per mile occur and what is the cost to repair them? How many combined-sewer overflow incidents happen per year? How much energy is used to treat each gallon of wastewater?

  Publicly available metrics are available on other, more visible, kinds of infrastructure such as ratings of bridges on structural integrity and roads on level of service. But there is no similar set of metrics, or similar requirement for transparency and accountability, for water systems. Instituting a basic measurement system will also help utilities determine asset management priorities.

The North Hudson Sewerage Authority's online Waterbody Advisory System provides real-time information about sewer overflows. Authority Executive Director Dr. Richard J. Wolff explains, "With increasing recreational activity in the Hudson River, it's important that people know when to avoid the areas around the outfalls, and our system enables them to do just that."

Longer-term Solutions for Education:

- **Require training for utility boards and local officials.** All utilities face pressure to keep rates as low as possible, and gaining acceptance of rate increases is extremely challenging. This tension may be particularly true on the local level since much of the public is unaware of how water/sewer service is engineered, operated, regulated and paid for. The situation is exacerbated because water infrastructure decision makers are sometimes not experts in water utility management, and may find it difficult to evaluate the need for system expenditures and to make the case. Training can help ensure water utility boards and local officials understand the ramifications of their decisions regarding capital investments.

- **Require utilities to integrate the community master plan and redevelopment vision, as well as focused community input, into their asset management program.** Asset management plans for water infrastructure improvement will be most successful when they are aligned with local land use planning. It is essential to anticipate when growth and development may increase the demands for service from drinking water, wastewater utilities and stormwater management efforts.

Development and redevelopment projects can contribute upgrades to water infrastructure systems, including rebuilding underground pipes and constructing above-ground green infrastructure. At the same time, city officials should be involved in helping water utilities define the levels of service they will provide, especially since ratepayers must help pay for them. In the best scenario, utilities' asset management plans can help align the interests of developers and city officials with their own, and help facilitate cooperation among all three.

Community members and elected officials plant a rain garden in the Town of Harrison, as part of the Passaic Valley Sewerage Commission's green infrastructure program.

PRIORITY SOLUTION 3:

Support and shape existing and new government funding initiatives

Jersey Water Works' goals all emphasize the need for water infrastructure systems to be maintained in a state of good repair, deliver optimum levels of service, and minimize lifecycle costs. But too few of New Jersey's water infrastructure systems generate sufficient revenues from user fees to fund capital investment and operations and maintenance budgets at the levels needed to achieve these goals.

Hundreds of drinking water, wastewater and stormwater systems serve the majority of New Jersey residents and businesses in developed areas (as opposed to those with their own wells and septic systems). Water systems may be owned by governmental entities — regional agencies, county and municipal utility authorities, or municipal governments — or the private sector (either investor-owned utilities or private companies). Regardless of ownership, their functions are very similar and, especially for drinking water and wastewater services, the utilities are all required to meet the same environmental standards.

User fees are the largest source of revenue for water and sewer utilities. These fees are customarily based on volume of use. (For large users such as commercial fire suppression systems that use drinking-water supplies, user fees may also be based on allocation of capacity.) User revenues provide all or nearly all funds for operations, maintenance, repairs and capital projects paid for via cash flow (as opposed to long-term financing), and user fees are also the primary source of funding to repay loans for new capital projects. Utilities also earn revenue from connection fees that are paid, typically by developers or property owners when they connect to the system, and may be raised based on increased capacity demands.

Utilities borrow funds through bonding, from governmental and private-sector loan programs and other sources. Borrowed funds are typically used to finance capital projects. The resulting repayments come out of primary revenue sources (user fees, connection fees, etc.). The New Jersey Environmental Infrastructure Financing Program, a state revolving loan fund jointly administered by the NJDEP and the NJEIT, is the primary source of federal and state support for water infrastructure

Through the NJEIFP, the state and federal governments provide financial assistance for important water infrastructure projects, like this one in Milltown. Photo credit: New Jersey Environmental Infrastructure Trust

capital projects. (More complete background on water infrastructure financing can be found in the background report in the Appendix.)

Given these facts, Jersey Water Works has developed recommendations to help ensure adequate state and federal government funding for water infrastructure.

Note: The participation of state and federal government members on the Steering Committee does not constitute individual or organizational endorsement of any of the recommendations presented here, especially regarding new funding or legislation.

JERSEY WATER WORKS PRIORITY SOLUTIONS FOR GOVERNMENT FUNDING

Jersey Water Works' priority solutions for government funding include two approaches.

Immediate Priorities for Government Funding:

- **Help shape new state funding for water programs that advance Jersey Water Works' goals.**
  While user fees will continue to provide the majority of funds for water infrastructure maintenance and upgrades, it's instructive to look at what other states are doing to raise additional funds for this purpose.

  - California passed a $7.1 billion bond issue by referendum in 2014.
  - New York's 2017 Clean Water Infrastructure Act allocated $2.5 billion in its state budget.
  - Maryland now has a new fee on all users of sewage and septic systems, which generates $127 million annually to improve water quality in the Chesapeake Bay.

  These programs each emphasize state matching grants to local utilities that serve as a catalyst to drive local investments in accord with state-level priorities.

  Any new state funding initiatives create an immediate opportunity to increase capital investment and job creation and also to advance the purpose and goals of the Jersey Water Works collaborative. This means they can, if designed properly, incentivize sustainable, cost-effective solutions that deliver multiple community benefits. One example would be to provide matching grants to utilities whose asset management programs drive down long-term costs by minimizing emergency repairs, reducing waste, and supporting sound management and innovation.

  Such an example matches public funds with responsible and prudent behavior on behalf of the recipient of taxpayer dollars, a hallmark of any successful public funding initiative. The positive impacts of such investments can last for decades, in addition to being visible in the near term, through local job creation and increased system efficiency.

Revenues from Maryland's Chesapeake Bay Restoration Fee finance upgrades to wastewater treatment plants and septic systems to improve water quality in the bay.

- **Communicate the importance of federal State Revolving Fund and U.S Department of Agriculture (USDA) water infrastructure financing programs.**

  Federal funding programs like the State Revolving Fund program and the USDA Water and Waste

Disposal Loan and Grant Program play a central role in financing upgrades for water infrastructure in New Jersey. Maintaining or increasing funding levels is vital to the health of local economies and the quality of the environment. Jersey Water Works members and other stakeholders must continue to call attention to the importance of these programs.

Like its counterparts in other states, the New Jersey Environmental Infrastructure Financing Program provides low-interest loans to local governments for investments in water infrastructure, non-point source pollution control, and conservation projects. That support is available mostly in the form of low- or no-interest loans, along with some targeted programs that offer principal forgiveness (i.e., grants) for part or all of the loan. The discounted loan rates offered by the financing program save a typical borrower in the state as much as 40 percent of the project's loan amount over the term of a 30-year loan. These savings can be viewed as the equivalent of a 40 percent principal grant.

In a similar vein, the USDA Water and Waste Disposal Loan and Grant Program provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and stormwater drainage to households and businesses in eligible rural areas. In 2016, this program provided $18 million in funding for New Jersey projects. Other types of federal direct assistance and grant programs also support important local projects, but are relatively small in scale.

New Jersey water utilities should avail themselves of low-cost opportunities to finance capital investments, especially where there are below-market interest rates and loan-forgiveness programs to reduce the burden on local ratepayers. **Jersey Water Works will find new ways to ensure federal and state decision makers understand the importance of the NJEIFP and USDA funding programs.**

The urgency of the challenge to repair the state's inadequate water infrastructure requires an even more focused approach and greater emphasis on action than the collaborative has employed to date. The Jersey Water Works priority solutions provide everyone in the sector with the next steps critical to our continued progress.

CONCLUSION

WE CANNOT IGNORE THE FRANK ASSESSMENT provided by Howard Neukrug and Diana Lind of the University of Pennsylvania: "The cost and complexity of our water challenges — floods, scarcity, emerging contaminants, polluted runoff, sewage overflows, safe drinking water, rising tides — require us to seek Collective Impact solutions: new alliances among utilities, governments, private companies and community to create long-lasting solutions."

All of us share the responsibility for transforming New Jersey's water systems. And now a powerful cross-sector alliance can be found in the Jersey Water Works collaborative. This year the collaborative agreed on an action agenda to advance three priority solutions to New Jersey's water infrastructure crisis:

- **Robust asset management** to enable water utilities to deliver the optimum level of service with the most community benefits at the lowest lifecycle cost.

- **Educated stakeholders** so that ratepayers and rate setters, consumers and policymakers can understand the value of investing in water infrastructure and the peril of deferring maintenance.

- **Government funding initiatives** to provide loans and grants to help upgrade systems.

Jersey Water Works provides the structure of committees, events, shared learning and partnerships so that members can transform New Jersey's inadequate — and in some cases hazardous — water infrastructure beyond an uneven patchwork of repairs and replacements. As we welcome a new governor, we must make the case that transforming our water systems is integral to our shared priorities: clean water and waterways; healthier, safer neighborhoods; new jobs and enhanced property values; flood and climate resilience; and economic growth.

No one organization can do this alone. To stay informed on new efforts, to be sure your vision and needs are included, and to add your expertise and leadership to move this action agenda forward, join Jersey Water Works. Together, we will achieve healthier, more vibrant communities and a more sustainable environment.

To learn more: www.JerseyWaterWorks.org

To become a member: www.JerseyWaterWorks.org/Become-A-Member/

ENDNOTES

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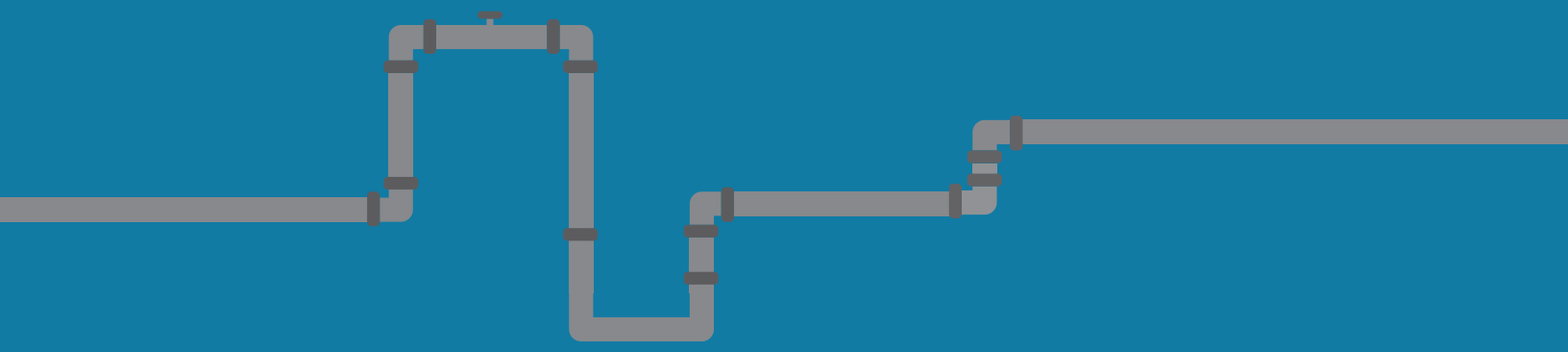

APPENDIX

The online Appendix to this report contains the following supporting materials. It can be found at www.JerseyWaterWorks.org/WaterTransformed.

Background Papers on Asset Management and Adequate Financing

In early 2017 the Jersey Water Works Steering Committee kicked off a comprehensive strategic planning process that identified two key obstacles to progress in upgrading New Jersey's water infrastructure systems: lack of adequate financing and lack of robust asset management. Next, smaller working groups and New Jersey Future staff prepared detailed background papers on each topic, including a problem statement; a system map describing the context; and a gap analysis explaining the many suboptimal outcomes. These background papers laid the groundwork for the Steering Committee's discussion of strategic solutions.

Full List of Jersey Water Works Strategic Solutions for 2017 – 2020

At a 2017 retreat the Steering Committee identified the solutions most likely to overcome the obstacles to robust asset management and adequate financing. Subcommittees then refined the solution lists into what the Steering Committee now calls *priority solutions*. The Steering Committee adopted them officially at its July meeting, and they are presented in this report. Note that the full list of solutions that were endorsed by the Steering Committee, including those not deemed "priority," can also be found in the online Appendix.

www.JerseyWaterWorks.org/WaterTransformed

JOIN THE MOVEMENT

Jersey Water Works is a cross-sector collaborative of individuals and organizations focused on transforming New Jersey's inadequate water infrastructure by investing in sustainable, cost-effective solutions that provide communities with clean water and waterways; healthier, safer neighborhoods; local jobs; flood and climate resilience; and economic growth.

BECOME A MEMBER:

Visit www.JerseyWaterWorks.org/Member

WHAT'S INVOLVED IN MEMBERSHIP?

As a member of the collaborative you will be able to:

PARTICIPATE in the work of Jersey Water Works - at the level you choose, such as by joining a committee, attending an event or implementing water infrastructure solutions at home or in your community.

STAY UP TO DATE Receive a bi-weekly member digest with updates, funding opportunities, news and resources.

CONNECT with colleagues and other leaders in the field, at meetings and conferences, and through the communications portal where you can also access member resources.

GET FEATURED to our growing network on the Jersey Water Works website and in the monthly e-newsletter.

MEMBERSHIP AGREEMENT

Membership is free! Members agree to do the following:

- Support the shared purpose and goals, either as an individual or as a representative of an organization
- Champion Jersey Water Works activities, including best practices, policy initiatives and awareness-raising efforts, that align with their organization's or their individual mission and values
- Implement and/or support water infrastructure solutions in their organization or community

Upon joining, members can indicate if they are interested in joining a committee. Committees meet quarterly (sometimes by phone) and also do work by email.

To learn more contact Info@JerseyWaterWorks.org

JERSEY WATER WORKS

Steering Committee

MARK MAURIELLO
Edgewood Properties, Co-Chair

JANE KENNY
Whitman Strategy Group, Co-Chair

ALYSSA ARCAYA
United States Environmental Protection Agency Region 2
Ex-Officio Non-Voting Government Member

JENNIFER BRUNTON
The Louis Berger Group Inc.

DREW CURTIS
Ironbound Community Corporation

PEGGY GALLOS
Association of Environmental Authorities of New Jersey

DENNIS HART
Chemistry Council of New Jersey

ANDREW HENDRY
New Jersey Utilities Association

PETER KASABACH
New Jersey Future

ANDY KRICUN
Camden County Municipal Utilities Authority

LARRY LEVINE
Natural Resources Defense Council

DEBBIE MANS
NY/NJ Baykeeper

STEPHEN MARKS
City of Hoboken

MEISHKA MITCHELL
Cooper's Ferry Partnership

CHRIS OBROPTA
Rutgers Water Resources Program

SHOSHANNA PAGE
New Jersey Urban Mayors Association

ROB PIRANI
NY/NJ Harbor and Estuary Program

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AJ SABATH
Advocacy & Management Group

RANDY SOLOMON
Sustainable Jersey

DAN VAN ABS
Rutgers University

MARGARET WALDOCK
Geraldine R. Dodge Foundation

DAVID ZIMMER
New Jersey Environmental Infrastructure Trust
Ex-Officio Non-Voting Government Member

New Jersey Future serves as the "backbone organization" for Jersey Water Works, and members of its staff facilitate the collaborative's work.

JERSEY WATER WORKS

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