Testimony to the Legislative Task Force on Drinking Water Infrastructure

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To the Co-Chairs and members of the Task Force, I thank you for the opportunity to discuss some critical issues of drinking water infrastructure. These issues also apply in many ways to wastewater and stormwater infrastructure, and all are fundamental to the functioning of our economy, protection of our environment, and support of our urbanized society. Please note that I am speaking in my personal capacity as a water management expert and am not representing Rutgers University or any other entity. My career in the water resources management field spans over 34 years in the non-profit sector, state government and now Rutgers. During my state service, I was project manager for the 1996 Statewide Water Supply Plan. I serve as a Governor's appointee and past chair of the New Jersey Clean Water Council, and am a Steering Committee member for Jersey Water Works, the collaborative previously mentioned by Governor Florio. Much of my testimony is based on work conducted with and for New Jersey Future, Jersey Water Works, and the New Jersey Clean Water Council, along with technical reports from various sources.

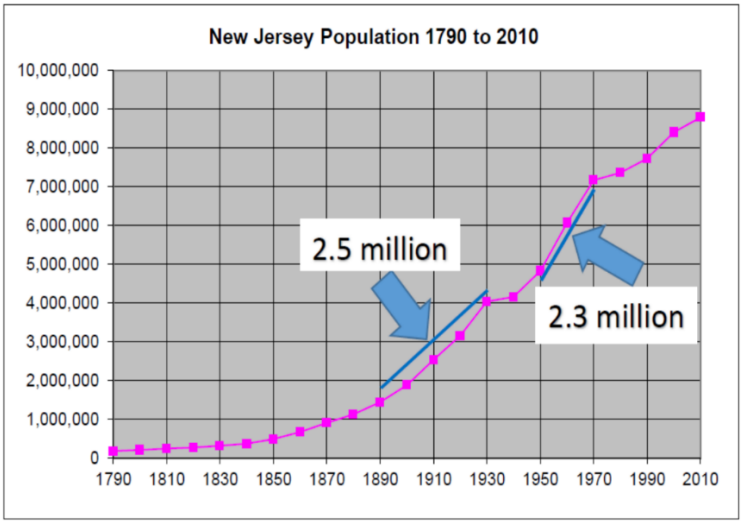
Starting with the good news, drinking water treatment facilities are routinely monitored regarding drinking water quality, the integrity of the physical systems, and their need for improvements. Because drinking water quality standards must be met, failure of the treatment systems is not an option, and so their maintenance is more assured. The major concerns for drinking water treatment relate to the quality and quantity of the original water supply and the risk of damages from disasters. After all, you can't provide what you don't have or can't treat and deliver.

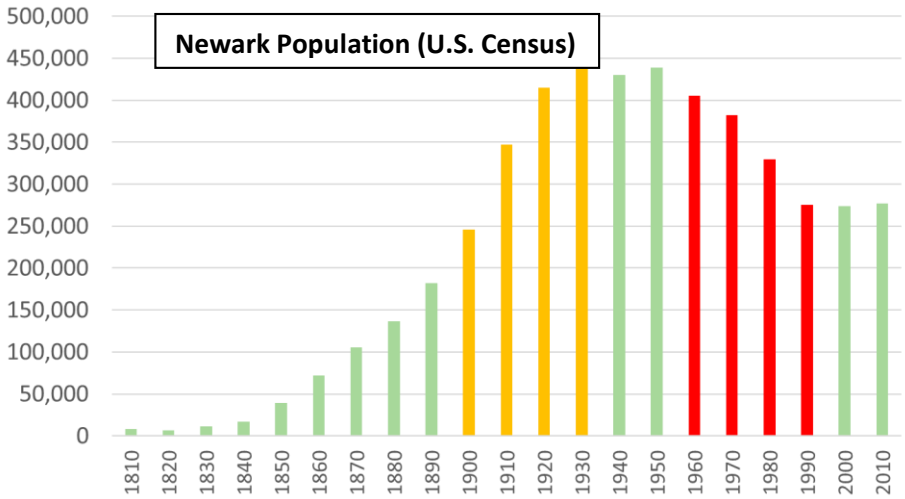
- Drinking water infrastructure is necessarily dependent on and affected by the source waters used (e.g., surface water reservoirs and run-of-the-river intakes; shallow aquifers; confined aquifers), the quality of those source waters, and the potential for future changes in source water quality and quantity. Therefore, source water assessment and protection is a critical aspect of drinking water infrastructure management, as the source waters drive treatment needs. In turn, many drinking water sources, treatment systems and distribution systems are at risk of damages from natural events, such as floods, stream and coastal erosion, and coastal storm surge. We should not view these issues in isolation.

Our major problems relate more to the distribution system – the pumps, pipes, and treated drinking water storage facilities that we rely on to ensure that water gets to customers every minute of every day. It is worth noting that in most urban and suburban areas, for every mile of road, we have three miles of water pipelines – supply, sewage and stormwater. Single drinking water utilities can have thousands of miles of pipelines, many pumps, and many water towers. We know from national studies and anecdotal information in New Jersey that insufficient investments have been made in these physical assets. The American Water Works Association estimated in 2012 that the United States needed to

invest roughly $1 trillion (with a "t") over a 25-year period. New Jersey has 2.8 percent of the nation's population, making our share $28 billion if all states had equivalent needs.

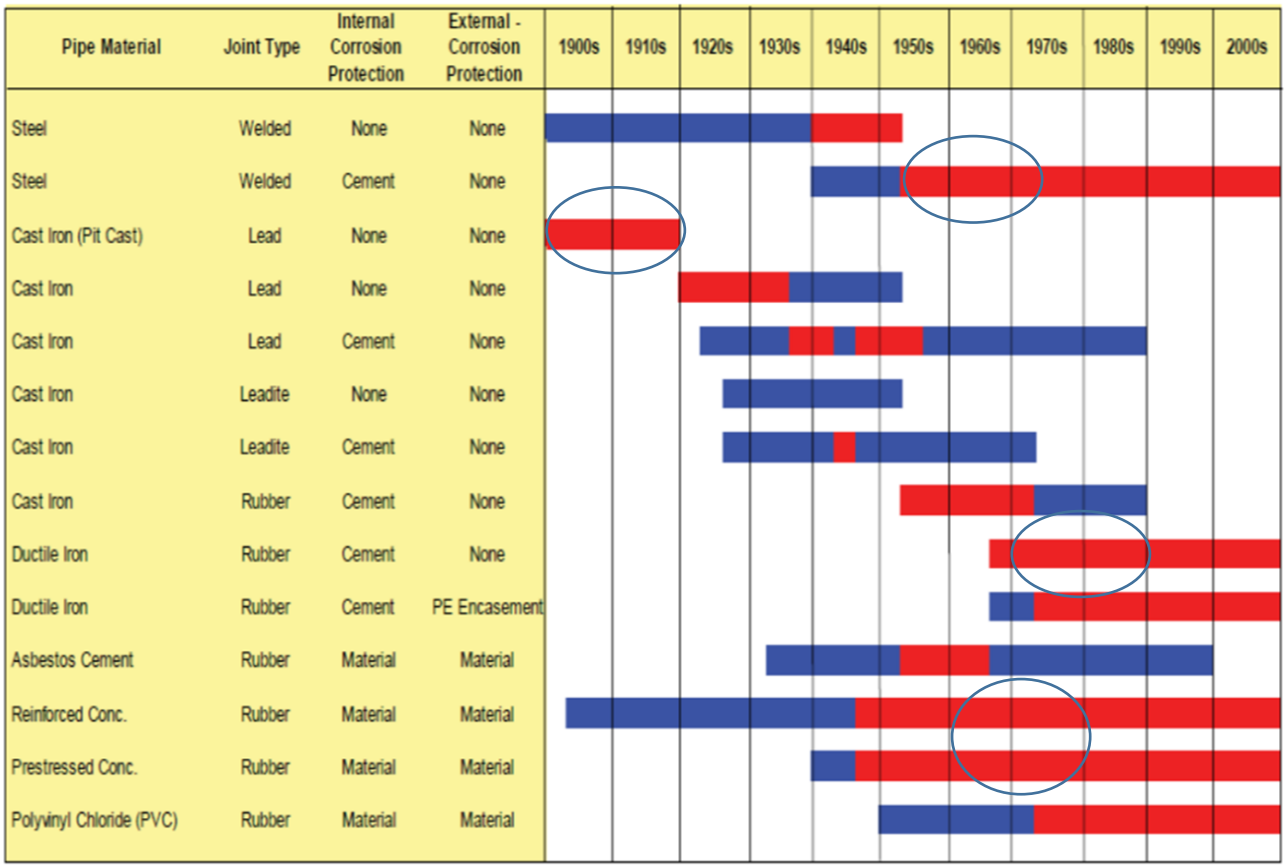
- Various cost estimates exist for drinking water infrastructure needs. We can be sure of only one thing – these estimates are all very rough. The USEPA Drinking Water Needs Survey is based on utility-reported needs that are eligible for funding under the State Revolving Fund program. Where utilities do not have complete asset management plans, their reported needs will not be complete. Ineligible costs are not included either. Therefore, the USEPA values should be considered very conservative. Actual needs are likely much higher.
- New Jersey's drinking water infrastructure was constructed primarily during the two major development periods of the state, from 1890 to 1930 and from 1950 through 1970, as shown in the first population graph below. The first period was characterized by rapid growth of our cities (as shown in the population graph for Newark) and first ring of suburbs. Even though the population of Newark and most other historic cities then declined (with the notable exception of Paterson), most of the original infrastructure still remains. The second period of growth was primarily in the suburbs and actually was closer to 3 million people, as the cities lost 700,000 people during that time period.





- The AWWA 2012 Report "Buried No Longer" assessed drinking water infrastructure needs through national-level estimates, primarily focused on pipelines. They evaluated the types and general average lifespans of distribution pipes commonly used during various periods, as shown in Figure 4 from that study. The circles indicate materials commonly used in New Jersey. The cast iron pipes from the early 1900s are estimated to have average effective lifespans of 100-120 years; New Jersey's urban pipes are that age or even older. The ductile iron pipes of the post-World War II period are estimated to have average effective lifespans of 50-70 years; again, many if not most of our suburbs are reaching or within that age range. Steel and prestressed concrete pipes are expected to last somewhat longer, on average.

Figure 4: Historic Production and Use of Water Pipe by Material



- As noted, New Jersey has 2.8% of the national population and therefore, if all infrastructure were equal across all states, our share of the estimated $1 trillion in needs (as estimated by AWWA) would be $28 billion. However, our core urban areas predate the existence of many states, much less their core urban areas. Suburbs in New Jersey are perhaps more equivalent in age to those of other states. We may have less need than many southern and western states for service area expansion, given our lower growth rates. Still, it is quite possible that our

"share" of the $1 trillion in needs is greater than our population share given the average age of our urban areas.

Infrastructure starts degrading the moment it is placed in service – that is the nature of physics, and can't be changed. We can slow that degradation through proper operation and maintenance, but in the long run we must repair, rehabilitate or replace all our water infrastructure or it will fail us. Physics doesn't care whether we have a strong or weak economy, who is in charge, or whether we have other priorities. We can reduce the costs through improved technology, planning, design and implementation – a process known as asset management – but sooner or later, we must pay the bill. The later we pay, the more we pay, because infrastructure decline accelerates over time.

As such, infrastructure costs are unlike most other societal priorities. If we invest half of what is needed, the systems will fail. If we invest three quarters of what is needed, the systems will fail – but more slowly. We have no choice but to invest, but there are better and worse ways of investing. **To succeed, we need improved asset management, capital investment, affordability and leadership.**

To manage our infrastructure properly, we need to inventory our assets. We also need to know the current quality of those assets, which ones are more or less critical to system function, and the level of utility service desired. From all this information comes a plan for repair, rehabilitation and replacement, which must then be supported by capital improvement budgets. Comprehensive asset management is increasingly being use by water utilities in New Jersey, but not across the board and relatively few utilities have complete programs. The NJ Department of Environmental Protection has begun requiring asset management programs for certain utilities, but these requirements are not yet uniformly applied.

Part of the difficulty is that asset management must be tailored to the specific needs of each utility, which vary in age, location, customer base, asset materials, and past management efforts. While the general outlines of good asset management are well known, setting regulatory standards for this process is much more difficult than setting drinking water quality standards. How good is good enough? How can we tell whether a utility's annual budget is sufficient to implement the plan, given that the plan may be implemented over decades? As shown in Newton last week, these issues aren't just a problem for our cities, but apply everywhere the infrastructure is aging – in other words, most of New Jersey's water systems.

- A fundamental reason we lack comprehensive estimates of drinking water infrastructure needs is that many utilities lack comprehensive asset management programs and therefore do not know their investment needs. Some utilities have complete or at least substantial asset management programs, but there is no system for collecting this information other than the USEPA Drinking Water Needs Survey. The Board of Public Utilities requires regulated utilities to provide information on infrastructure needs in support of rate case filings, but again this information is not compiled. What information we have is not evaluated to establish baseline status, benchmarks for utility asset management needs, or trend information.
- A significant question is how much water is currently "lost" after it leaves the well or treatment plant. This amount is variously called "unaccounted for water" (UAW) or "nonrevenue water" (NRW); the latter is the more current nomenclature. The AWWA M36 Water Audit method is becoming the national standard. It provides for a more detailed assessment of NRW than the

existing NJDEP requirement for assessing UAW, which is a simple percentage of water that is produced but not delivered to a metered customer. NRW addresses the following issues:

- Water losses can be "real" – that is, the physical leakage of water from water mains, service lines, plumbing and fixtures. A portion of these losses is inevitable, as no system is entirely without leakage. Such losses are considered irreducible or unavoidable. The amount of irreducible losses depends on a variety of factors, including hilly areas (which requires higher pressure zones to move water against gravity). Other losses are a function of inadequate maintenance. It is important to note that inefficient water uses, such as older appliances and overwatered lawns, are not considered water losses, but rather are addressed through water conservation and use efficiency measures.
- Water losses can also be "apparent" – that is, water that is actually delivered to a use but either not metered (e.g., firefighting, line flushing, theft) or metered inappropriately (i.e., where meters are inaccurate). Meter inaccuracies can both increase and reduce apparent losses.
- Some forms of NRW may be metered but not billed, and therefore are considered consumption. As one examples, municipal utility departments might not bill water use by municipal buildings.
- Importantly, a water audit does not determine whether a certain level of water loss is "right" or "wrong." Rather, it provides a way of assessing which water loss factors can be resolved cost-effectively.

- The State of Indiana adopted legislation in early 2016 requiring that every community water system conduct a water loss audit using the AWWA method. They achieved 100 percent compliance <u>the same year</u> and published a report showing that average nonrevenue water (NRW) ranged from 19 to 24 percent and did not vary significantly with utility size. As with New Jersey, they found many pipes were reaching the end of their expected service lifespan.
- The Delaware River Basin Commission (DRBC) has required annual water audits for all community water systems that rely on water from the Basin. The recent report on the 2014 submittals (DRBC, 2016) summarizes the results of 276 water audits, of which 20 systems accounted for roughly 70% of the total volume of water production (with the largest by far being Philadelphia), and only 11 systems exceeded 10 MGD (million gallons per day). The report notes that NRW exceeded 15% of total water produced for over 150 of the 276 audits, but indicates that using this percentage is not modern practice because it will understate NRW problems in utilities that have inefficient water customers (i.e., higher total volume) but otherwise equivalent NRW volumes. Most of the reported losses were considered "real" losses rather than "apparent" losses, with median losses of approximately 65 gallons per service connection.
- NJDEP does not have a similar uniform reporting process for water losses; rather, water loss information (using the older but still required UAW method) are submitted in support of water allocation permit decisions. Many systems that are using the AWWA method have not needed to provide the results to NJDEP due to how the regulations are written. The Indiana and DRBC examples show the viability and value of a uniform approach.
- Discussions with utility managers make clear the problem with establishing a single target for water losses. Well-managed systems in the Coastal Plain area of New Jersey are achieving real water losses of 5 percent or less, while achieving the same rates in areas of northern New Jersey, with hills that require higher pressure zones, could be extremely difficult if not

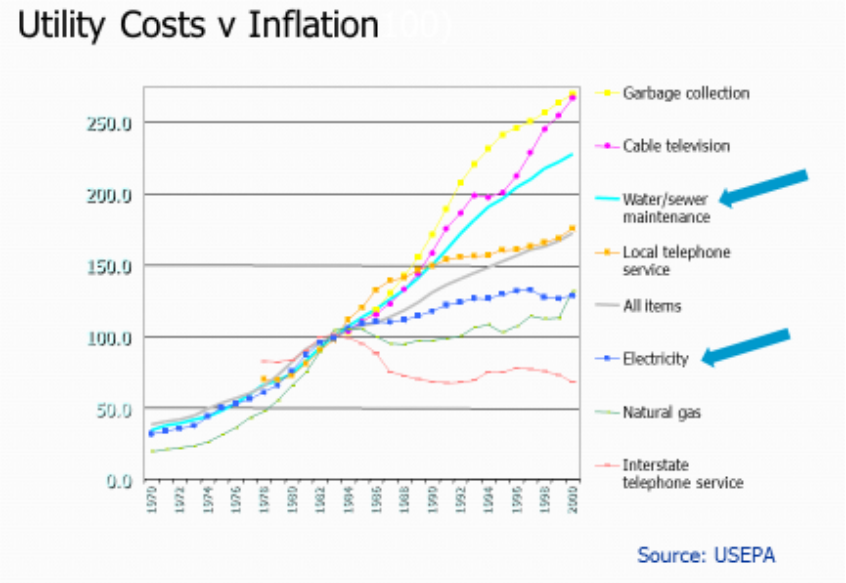
impossible. Anecdotal evidence indicates that a 15 percent threshold for real water losses might be appropriate in hilly areas. Therefore, any single, statewide target would likely allow excessive losses in some areas but perhaps be unachievable in others.

Tied to the difficulty of standards for asset management is the issue of rate setting. In the drinking water field, we have hundreds of systems. Roughly 40 percent of all utility customers are served by investor-owned utilities, which make their profits based on investment, not operations. These utilities therefore have a strong incentive to invest. The Board of Public Utilities is responsible for making sure that the utilities don't <u>over</u>invest or invest in the wrong things. But how can the BPU know whether a utility is not investing <u>enough</u>? Clear and appropriate management standards can provide answers.

Government utilities, whether municipal departments or utility authorities, don't have the same price signals. They can't make a profit, and they are under constant pressure to minimize current rates, at times regardless of future needs. The Division of Local Government Services in the Department of Community Affairs helps ensure that these utilities have sufficient revenues to cover operational costs, reserves, and payments on debt. Again, how are they to know whether a utility is underinvesting, and what could they do about it if so? As a side point, it is worth noting that if a utility is underinvesting, the utility can't have "excess" revenue that can be contributed to the municipal government – and yet these diversions occur anyway.

In both cases, an underlying deterrent to proper investment is affordability. In New Jersey, most customers can afford an increase in rates, but many people cannot. We have cities where over 25 percent of all households are below the federal poverty rate, which doesn't reflect the full picture of poverty due to New Jersey's higher cost of living. People often oppose rate increases in part because low-income and even moderate-income households will be harmed. The results are underinvestment, which in the long run is a losing proposition, or a call for grants, which subsidizes those who can afford to pay, or both. We should recognize that putting off investments will hit the low and moderate income households <u>even harder</u> at some point in the future, when the inevitable costs come due as our utility systems increasingly fail.

- As shown in the graph below from USEPA, water and sewer rates (Water/sewer maintenance) have been rising faster than the consumer price index (All items) for decades. The disparity began during the 1980s, in response to new drinking water quality and wastewater treatment requirements mandated by the federal Safe Drinking Water Act and Clean Water Act, and equivalent state legislation. We should not expect this trend to change significantly, though improved technology is helping to reduce rehabilitation and replacement costs somewhat. Circle of Blue, a non-profit organization that tracks water rates, in a survey of 30 major cities found that the median increase in residential water rates was 4.5 percent (compared to a core Consumer Price Index increase of only 1.8 percent for the year) and a 41 percent since 2010.



- It is important to note that AWWA did not determine the extent to which existing water rates can address the $1 trillion in national needs. Some infrastructure rehabilitation and replacement is already happening in New Jersey under current rates, and this activity will likely continue. Therefore, some (unknown) portion of our total (partially known) needs will be met by existing rates. In addition, infrastructure rehabilitation and replacement will, over time, provide savings through reduced energy demands, water losses and emergency repairs. Some of these savings will accrue to existing rates, but some savings will be felt more through lower rate hikes than would otherwise have been necessary.
- The Governor's Sustainable Infrastructure Task Report for Pennsylvania concluded in 2008 that their gap between infrastructure needs and revenue would be almost completely eliminated if utilities charged the full cost of drinking water and sewer service up to 1.5 percent of the community median household income for each service (3 percent total). Other sources of funding would be needed to address affordability issues in some communities.
- Similarly, the Delaware Water Infrastructure Advisory Council concluded in 2015 that a significant portion of their estimated $1 billion investment need (20-year period) for drinking water systems could be met by the ongoing pace of investment. By comparison, Delaware's population is less than 1 million (compared to New Jersey's nearly 9 million) and the average age of their drinking water infrastructure appears to be newer than for New Jersey.
- The following two tables provide a sense of the looming affordability problem in many municipalities. The first table compares the statewide median household income to medians for seven urban municipalities with combined sewer systems, and also indicates the percentage of households with median incomes below $20,000. As can be seen, only Hoboken has a higher median household income and a lower percentage of very low income households than the statewide medians. The second table shows the percentage of population below the federal poverty rate for 18 CSO municipalities. It should be noted that the New Jersey cost of living is roughly 25 percent higher than the national threshold, and therefore all the percentages shown in this table are lower than the reality faced by these households.

Household Income for Selected CSO Municipalities		
Municipality	**median HH Income, 2006-2010 ACS**	**% HH Income <$20,000**
Hoboken	$101,782	12.15%
Jersey City	$54,280	19.68%
Bayonne	$53,587	17.07%
Elizabeth	$43,770	20.97%
Newark	$35,659	31.63%
Paterson	$34,086	30.95%
Camden	$27,027	39.40%
New Jersey	**$80,992**	**13.97%**

Poverty Levels of CSO Municipalities

From 2008-2012 American Community Survey		
Over 20% of Population Below U.S. Poverty Line	**10% to <20% of Population Below Poverty Line**	
Camden (38.6%)	West New York (18.8%)	Hackensack (13.7%)
Newark (28.0%)	Elizabeth (18.8%)	Gloucester City (13.4%)
Paterson (27.6%)	Jersey City (17.6%)	Bayonne (12.6%)
Trenton (26.6%)	East Newark (17.1%)	North Bergen (11.9%)
Union City (22.4%)	Guttenberg (14.9%)	Weehawken (11.3%)
Perth Amboy (21.2%)	Harrison (14.9%)	Hoboken (10.9%)

- In 2017, New Jersey Future and my team at Rutgers will be developing an inventory of water and sewer rates for all major utilities in New Jersey and as many smaller systems as is feasible and available, and comparing those rates to available household income data by census tract. This analysis is being developed in support of the Jersey Water Works goal for affordable water utility services, to provide a baseline for current conditions.
- Median income is a rough indicator of affordability as household incomes do not always occur on a smooth "bell" curve; incomes below the median can be bunched close to the median or far below it. Median simply means that half the households are above that level and half below.

We should recognize that current statutes are unclear regarding infrastructure integrity. We have clear expectations for drinking water quality, but we have no clear integrity requirements other than knowing we don't want systems to break. We also should recognize that the nature of water utility management is changing. Historically, they have preferred to be the unseen utilities – not being in the papers meant that nothing went wrong. We are now facing a period of major investment, which will require sufficient revenues. Utility leadership will be needed to help people understand the needs, how their money will be invested well, and how we measure success.

In summary, I would recommend that the Legislature look at these interconnected issues:

1. **Asset management.** Ensuring that all water utilities thoroughly understand their assets, critical components, investment needs and management concerns, without being unduly prescriptive regarding the specific technical approaches for each utility.
2. **Adequate capital investment levels.** Ensuring that both investor-owned and government water utilities have incentives and regulatory requirements that ensure sufficient, cost-effective but

not excessive capital improvements. These regulatory efforts will require close coordination between NJDEP, which understands water infrastructure, and both BPU and the Division of Local Government Services, which have responsibilities regarding utility budgets.

3. **Affordability**. Ensuring that lower income households are not harmed by utility rates necessary to support proper asset management. Our household energy assistance programs could serve as a possible model.
4. **Leadership.** Ensuring that all those involved in utility management understand the need to step up and exhibit leadership toward sound water infrastructure than can support New Jersey for many decades to come.

Fortunately, there is far more attention to and interest in water infrastructure management than was true in 2010, when the New Jersey Clean Water Council concluded that:

> **New Jersey can maintain a viable economy with a sound environment only if it ensures that its water supply, wastewater and stormwater infrastructure is effectively maintained in a manner that produces the lowest life-cycle cost.**

Action is being taken at the utility and state government levels, and Jersey Water Works is developing a strong collaborative effort among the major infrastructure interests to understand what is needed and how to promote effective action. The Legislature can play a key role by reinforcing these efforts. Thank you for your attention to the issue of drinking water infrastructure, and I look forward to assisting with this issue in whatever ways are appropriate.