



## WASTEWATER



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## EXECUTIVE SUMMARY

Aging wastewater management systems discharge billions of gallons of raw sewage into Pennsylvania's surface waters each year. The average age of most sewer systems is approaching 70 years with many having pipes over 100 years old. 1.6 million homes in PA are served by on-lot systems with failure rates of nearly 20%. Half of the State's Sewage Facilities Plans are over 20 years old. It is estimated that the Commonwealth has a funding gap of \$8.4 billion over the next 10 years to repair existing systems, upgrade existing systems to meet regulatory requirements, control Combined Sewer Overflows, address illicit Sanitary Sewer Overflows, and construct new or expand existing systems to meet increasing demands. Available funding over that time is estimated to be \$900 million, approximately 10% of the required annual investment.

## BACKGROUND

One of the most vital, though possibly most frequently overlooked, systems of our society is the sanitary handling of wastewater. While treatment of wastewater may seem paramount, collection and conveyance are equally important to protect water quality and safeguard human health.

Pennsylvania has an enormous inventory of wastewater infrastructure. There more than 5,300 sanitary sewer facilities that operate under the National Pollution Discharge Elimination System (NPDES) in Pennsylvania. As time passes, more and more of these facilities are passing into private hands. At last count, according to the Pennsylvania Department of Environmental Protection (PADEP), more than 2,200 facilities are publicly owned with nearly 4,300 privately owned.

While not faced with explosive population growth that is applying pressure to wastewater systems in other portions of the country, Pennsylvania is facing the threat of infrastructure reaching the end of its useful life. Unfortunately, this is often not realized until failure occurs. And when failure occurs, the environment and public health are exposed to great danger.

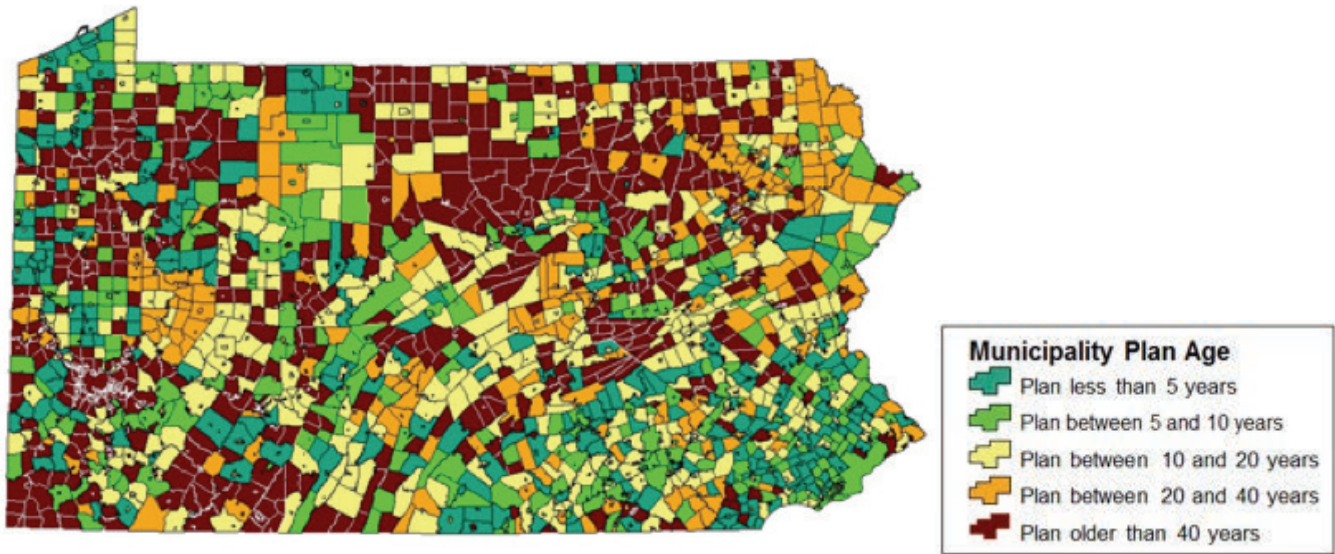
## CONDITION AND CAPACITY

The sheer number of NPDES permitted facilities exerts substantial demand on PADEP staff when it comes to regulating these facilities. This is particularly apparent when reviewing the number of periodic inspections conducted over the years. In 2014, 966 inspections were conducted on major treatment plants (flows exceeding 1 MGD), resulting in 296 violations. In 2017, the number of inspections fell by nearly a third to 689. Despite the sharp drop in inspections, reported violations fell disproportionately by only 21%. A greater reduction in violations should have been expected. On a positive note, facilities treating more than 5 MGD saw more than a 50% reduction in violations compared to the 35% reduction in frequency of inspections.

According to a 2015 study conducted by the Center for Rural Pennsylvania, more than 1.6 million homes, or greater than 30% of the state, is served by on-lot septic systems (OLS). No statewide data is available on the percentage of these OLS that are failing to function as intended, nor remediation costs for homeowners. National failure rates for onsite sewage treatment and disposal systems are reported at 10% annually by the United States Environmental Protection Agency (EPA); however, estimates of failure rates in Pennsylvania range upwards of 20% due to the frequent occurrence of soil conditions unsuitable for OLS. PADEP's report from 2016 shows that OLS failures are associated with degrading the quality of 202 miles of streams and 3,304 lake-acres. Contamination of groundwater and surface water by failing or substandard septic systems is a considerable risk. PADEP's Bureau of Clean Water Management oversees the licensing for Sewage Enforcement Officers (SEOs), but since 2011, no longer compensate the SEOs or municipalities that employ them for required training. The number of OLS has grown between the 1990 - 2010 censuses, and PADEP anticipates this number continuing to increase.

The Pennsylvania Sewage Facilities Act (Act 537) requires that all municipalities develop and implement Act 537 Plans that provide for the resolution of existing sewage disposal problems, provide for the future sewage disposal needs of new land development, and provide for the future sewage disposal needs of the municipality. These plans are required to consider growth for 10-

FIGURE 1 – PENNSYLVANIA’S ACT 537 PLAN AGE



Source: Pennsylvania Department of Environmental Protection, 2015

20 year periods and are to be updated to stay current and relevant. However, as of the beginning of 2015, of the 2,575 Act 537 Plans in existence, as shown in Figure 1, 50% are at least 20 years old and over 33% are more than 40 years old. For many years, municipalities were able to apply for grants through PADEP to cover 50% of the costs to develop Act 537 Plans. Unfortunately, this assistance was eliminated in 2014. Consequently, the high cost associated with updating Act 537 Plans serves as a significant deterrent to municipalities.

The average age of sanitary sewers varies by community with industrial age cities having pipes dating back to the turn of the 19th century and sewers in communities developed post-World War II now approaching 70 years old. Philadelphia has reported the average age of sewers there is 100 years old. The rate of pipe replacement remains below that of what is required to meet a sewer pipe’s life cycle, meaning these facilities will be kept in operation longer than designed, putting public health at risk and increasing the likelihood of more expensive costs in the event of complete failure.

While the condition of wastewater infrastructure is of paramount concern, inadequate capacity of infrastructure is a growing issue in and around metropolitan areas. As a whole, population growth within Pennsylvania has waxed and waned in recent years. However, metropolitan areas, particularly in southeastern Pennsylvania is taxing already stressed infrastructure. Attention is required to ensure that infrastructure capacity keeps up with anticipated growth rates. For this reason, up-to-date Act 537 Plans are imperative to ensure future needs are met.

Pennsylvania retains its title as having the most combined sewer overflows (CSO) of any state in the country. CSOs which convey both storm and sanitary sewer flows, resulting in the release of untreated human and industrial waste and other pollutants into the environment. The 1,608 CSOs systems across 39 counties also account for some of the highest occurrences of overflows in the country. Such occurrences can significantly impair water quality and impact public health and wildlife. Although measuring the volume of CSO discharge is difficult to estimate given that the quantity, frequency and impact are unique for each CSO system, municipalities are trying to reduce the frequency and volume of CSO overflows. One example is the Philadelphia Water Department, that estimates between 2011-2016 their CSO discharges were reduced by 600 million gallons per year. Although this number may sound large, considerable work is still needed given it is estimated that there is an annual CSO discharge of 16 billion gallons annually in Philadelphia alone.

## FUNDING & FUTURE NEED

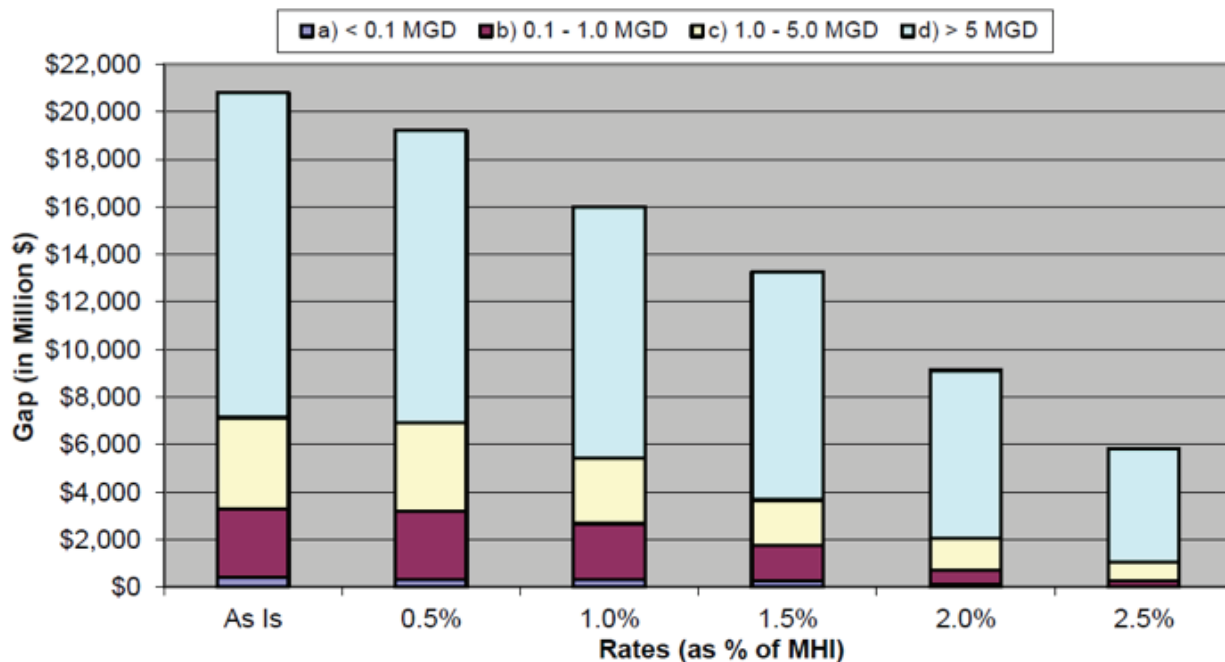
The most common source of funding for Pennsylvania’s aging wastewater infrastructure are user fees, which are charged by most public sewer authorities and all private sewer companies. User fees are typically based on a percentage of the service area’s median household income (MHI). Certain grants are also scaled to recognize through additional funding those authorities that have higher percentage user fees of MHI. Even with these funding sources, the total wastewater funding gap over the next 10 years in Pennsylvania is estimated at \$8.4 billion. Most user rates paid by customers today do not reflect the long-term costs of maintaining and repairing wastewater infrastructure; often they are just a reflection of short-term capital improvement costs and operational costs. Some public and private systems incorporate asset management programs as a tool to prioritize infrastructure improvement and optimize the operation of their systems. This results in proactive infrastructure improvement as opposed to emergency repairs, which greatly reduces costs.

While sewer ratepayers are the primary source of funds for operation, maintenance and some capital improvements, federal and state funding are also major sources for capital improvements to Pennsylvania’s aging wastewater infrastructure. The main source of federal funding is the Federal Clean Water State Revolving Fund (CWSRF), which is managed by the Pennsylvania Infrastructure Investment Authority (PENNVEST). PENNVEST is expected to provide \$500 to \$600 million over the next 10 years in grants and loans for wastewater projects. The most significant additional source besides PENNVEST, is loan and grant monies from the United States Department of Agriculture, Rural Development (USDA RD).

If user charges were increased to 1.5% of MHI the wastewater funding gap would be reduced. Use of 1.5% as an affordability standard is based on experience in several national financial assistance programs over the past 50 years, and is considered a reliable indicator of what the affordable ceiling should be for the customers of a wastewater system.

Figure 2 shows that wastewater systems need a total of \$20.8 billion more to satisfy 20-year needs than is provided at the current wastewater user rates being charged. Many systems will not be able to meet their needs through increasing user rates without funding assistance. The largest gap dollars are in the largest wastewater systems.

**FIGURE 2 – PENNSYLVANIA’S WASTEWATER FACILITIES – GAP VS. RATE**



## PUBLIC SAFETY

Inadequate collection, conveyance, and treatment of wastewater can have dire consequences on human health and the environment. The release of raw sewage into the environment has the potential to impair our drinking water, spread disease, and decimate waterways. In Pittsburgh for example, sewer overflows into the city's rivers affect nearly half of the 140-day boating season (May 15-October 1) making water unacceptable for recreational contact.

## RESILIENCE & INNOVATION

Climate change poses a significant challenge to wastewater systems throughout Pennsylvania. Per the USEPA, precipitation from extremely heavy storms has increased 70% in the Northeast United States since 1958. These storms intensify flooding and, can overwhelm sanitary sewers and treatment plants, resulting in the release of untreated sewage into the environment. Significant steps are needed to increase the resiliency of our wastewater systems from flooding risks especially as annual precipitation and the frequency of heavy downpours are anticipated to continue to rise.

Besides renewing and expanding sewer capacities, communities with CSO systems are also beginning to deploy green infrastructure to reduce the impact of stormwater on these systems. In 2018, the City of Philadelphia met its 5-year goal of "greening" 774 acres and removing 600 million gallons CSO discharges and has a goal of achieving 10,000 greened acres by 2036. The EPA has highlighted The City of Lancaster's *Green Infrastructure Plan* as a national model. The 25-year \$140 million plan is expected to save the city \$5 million annually and prevent over 1 billion gallons of CSO discharges from polluting the Conestoga River.

Pennsylvania has made great strides in the innovative disposal of biosolids (e.g., wastewater treatment sludge) and resource recovery using biogas (e.g. fuel produced from sludge). Instead of disposing of the nutrient rich biosolids in valuable landfill space, land application has increased. This has benefited farmers by allowing them to save money on commercial fertilizers and improving the quality and structure of the soil. Additionally, land application of biosolids has been used to aid reclamation at mining sites and forestry.

The American Biogas Council ranks Pennsylvania ninth among U.S. states for methane production potential from biogas sources, a majority of which are wastewater treatment plants. There are 173 operational biogas systems in the state with the potential for more than 348 more. If the potential were fully realized, enough electricity could be generated to power more than 150,000 homes while reducing greenhouse gas emission by the equivalent of 18.1 trillion tons of carbon dioxide.



## RECOMMENDATIONS TO RAISE THE GRADE

- **Implement the use of infrastructure Asset Management programs on a larger scale.** Through Asset Management, detailed inventories of system components, operation and maintenance tasks, and long-range financial planning can be developed. Effective Asset Management programs can save money by timing the replacement of infrastructure/assets so that useful life is maximized and expensive catastrophic failures are minimized.
- **Implement reasonable increases in what customers pay for wastewater services to reflect real costs of service.** User fees should be evaluated for increases greater than 1.5% MHI in communities that can tolerate higher rates based on income, since there is still a projected funding gap even with rates set at 1.5% MHI.
- **Provide more state and federal sources of grant funding to subsidize the projected funding gap that cannot be met with reasonable rate increases and for communities with below average income levels.**
- **Evaluate consolidation of smaller wastewater systems into regionalized systems to spread the capital and operating costs across a larger customer base, streamline management, and increase cost-effectiveness for customers.**
- **Increase funding for PADEP to maintain a level of inspections adequate to protect human health and the environment, provide funding for the training of SEOs, and increase grants for Act 537 Plan updates.**



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