



2018

**Tennessee's Roadmap to Securing the Future of  
Our Water Resources**  
Infrastructure Working Group  
Executive Summary

There are clear differences in level of service for water and wastewater within the State of Tennessee. These differences have been identified by Grand Division as well as by county and community. It is difficult to make broad generalizations about the adequacy of the system because, for the most part, water and wastewater service is provided in so many ways by many entities.

When evaluating the condition of Tennessee's water and wastewater infrastructure system, a number of approaches were used to determine infrastructure stress. The infrastructure section of the plan summarizes the data considered as well as the methodology used to quantify the level of stress and forecast of infrastructure needs.

The state is fortunate to have extensive documentation of its water and wastewater infrastructure systems through the Tennessee Department of Environment and Conservation (TDEC). This data, coupled with system-specific information, provided the working group the means to determine infrastructure stress, both in 2018 and through the forecast period of 2040. Generally speaking, data was evaluated for (a) water treatment capacity; (b) water system sanitary survey scores; (c) water system notices of violation; (d) water distribution system water loss; (e) wastewater treatment plant capacity; (f) wastewater system notices of violation; and (g) wastewater system overflows.

Other non-state resources were incorporated into assessing the status of Tennessee's water and wastewater infrastructure, including the American Society of Civil Engineer's (ASCE) "Infrastructure Report Card" for Tennessee and supporting documentation collected by ASCE.

The working group acknowledges that there are additional differences between the current and future needs for areas or counties designated as "urban" service areas, versus those currently classified as "rural". It is also important to note that many of the areas designated as "urban" were originally classified as "rural" because historically many of these area expansions required upgrades. Therefore, it is reasonable to anticipate that this trend of transition will continue across the state as overall population increases.

## Existing Conditions - Water

Tennessee's drinking water infrastructure is composed of multiple raw water sources being treated by a variety of methods and distributed through underground pipeline networks. These networks vary in size, length and age of the system itself.

Most systems in the Middle and East Grand Divisions utilize surface water for their source due to the inadequacy of below-grade aquifers. A majority of these are dependent upon reservoirs constructed and managed by either the US Army Corp of Engineers (USACE) or the Tennessee Valley Authority (TVA).

Distribution is very similar among all the systems across Tennessee. Pipelines of varying sizes are routed throughout the service area either under streets, in public rights of way, or on easements through citizens' property. Water storage tanks are used to either buffer flow variations or provide volume for firefighting at appropriate points throughout the systems. TDEC currently requires systems to maintain 24 hours of average daily demand in water storage.

The number and size of interconnections to nearby water systems vary considerably throughout the state. Generally, the more densely populated urban counties are better connected to neighboring utilities than the more remote rural counties. Concerns about stagnation and water quality degradation in long waterlines, coupled with the high cost of running long pipelines, hinder most rural water systems

from connecting with their neighbors. Potable water is provided within most Tennessee urban counties either by municipal entities, utility districts, authorities, or other public entities. However, many Tennesseans still have their own private wells within areas designated as both “urban” and “rural”

A greater ratio of these private sources is found in the rural counties of the West Grand Division and to a lesser degree in the southeastern quadrant of the East Grand Division where there are sand aquifers within reasonable depths. Individual wells are sporadically placed in the Middle Grand Division; however, the underlying geology does not favor their use in most cases.

Continued growth in the number of private wells has also coincided with rural community growth due to prohibitive “costs to serve” considerations in many areas. It is also understood that the expansion of private wells is becoming more challenging due to aquifer quantity and quality at depths that are economical. Adding to this challenge is the increased use of irrigation from private wells in agricultural-based businesses.

### Existing Conditions - Wastewater

Approximately 60% of Tennesseans are served by centralized wastewater collection and treatment systems. The means of collection and treatment among these systems differs greatly. Traditionally, most systems use a combination of gravity collection mains and pumping stations to convey flow to a treatment works of some sort. It is worth noting that, due to terrain and topographic constraints in population growth areas, pressurized systems with individual pumping facilities are used more often in lieu of gravity systems because of their economic benefits and growing reliability. Treatment works can vary from simple lagoon treatment to membrane filtration depending primarily upon the level of treatment necessary to comply with the discharge permit issued by TDEC.

The remaining 40% of Tennesseans are served by decentralized collection and treatment systems. These systems generally involve either household septic tank and leachate field systems or, in some cases, community wastewater collection and treatment at a small decentralized unmanned packaged treatment unit. Disposal for these systems usually involves drip dispersal of the treated water into a dedicated plot of land.

### Infrastructure Management & Financing

Effective management of Tennessee’s public water systems is critical to the financial condition of the state as well as ensuring quality of life for its citizens. To that end, multiple state oversight agencies are in place to maintain financial, managerial, and regulatory compliance. These agencies include the Water and Wastewater Finance Board (WWFB), Utility Management Review Board (UMRB), Tennessee Public Utility Commission (TPUC), TDEC, and the U.S. Environmental Protection Agency (EPA). Additionally, multiple state and non-governmental organizations exist to assist public systems in their financial, management, and regulatory compliance.

Funding opportunities for public systems are available through a multitude of federal and state sources. Public finance sources are also available including public bond markets, bank programs, and bond funds. Each of these programs has their own requirements and structural components, as well as incentives and concerns.

Regardless of the funding method, except for direct grants from federal and state agencies, the ability to fund the needed improvements and resulting debt service is a critical element of the decision-making process for a system's governing body. Balancing the demands of system maintenance and growth with the community's ability to pay is often the most difficult charge for a governing body.

### Projected Future State of Tennessee's Infrastructure

An overall growth in population of 23% between 2018 and 2040 is forecast for Tennessee, reflecting a total population increase of 1,561,213. It is projected that 90% (1.4 million people) of this increase will be in urban counties, with rural counties seeing growth of 10% (approximately 200,000 people) in this 23-year period. With this growth comes a reasonable obligation to make public water and wastewater services available to the growing public.

At the same time, while Tennessee's public providers are to be commended in their proactive approach to maintaining the current systems, attention must be given to additional maintenance, repair, and replacement of the existing aging infrastructure. To attempt to do so today on a comprehensive level would create a prohibitive rate structure, for which most of the public could not bear. Considering this challenge, forecasting the future infrastructure needs first comes down to the dollars that must be invested to meet these needs, regardless of the funding source. To refine this effort, it was appropriate to allocate these needs into two key categories: "Cost to Serve" and "Repair and Replacement".

Utilizing the available data as referenced above, it is estimated that **\$15.6 billion** must be invested in **Tennessee's water and wastewater infrastructure** between now and 2040 to meet the projected needs for both repair and replacement of our existing infrastructure, coupled with the dollars needed to serve other growth areas of the state. It is further noted that, even with this investment, the growth and existence of private water and wastewater systems will continue to be limited simply due to excessive "Costs to Serve" factors, thereby making public services impractical in some areas.

Historically, contributing capital, such as private party contributions, often the development community, and grants, has been available to most communities, which has helped to offset the total investment needs. For purposes of projecting actual funds needed that would fall under a given county's responsibility, it is reasonable to assume that some level of contributing capital would continue to be made available. Taking this factor into consideration, the **"Total Funding Needs"** to address both "Repair & Replacement" costs and "Costs to Serve" in Tennessee for the projected growth period is **\$13.9 billion**.

It is acknowledged that, even with this funding source continuing to be in place, some public entities will not be able to fund what would be considered the local share without burdensome rate increases for their customers. Therefore, and in keeping with legislative action establishing the Water Resource Act, it is encouraged that this Act be implemented in a way that creates additional funding sources for Tennesseans to meet these needs while offsetting excessive rate adjustments.

### Additional Recommendations

Six (6) other factors must be addressed concurrently with infrastructure funding in order for Tennessee's plan to be successfully implemented. First, acknowledging that this was not the charge of the Task Force in the development the plan, attention must be given to maintaining and improving the **quality** of raw water that is used to serve the public. This includes both surface and ground water sources.

Second, the establishment of consistent monitoring, data collection, and reporting is encouraged, thereby resulting in usable modeling and trending data. This should be implemented (a) to include all major water users and stakeholders; (b) based upon the most current and accepted science-based practices; and (c) with the goal to establish a means of comprehensive planning and information sharing.

Third, Tennessee must continue to embrace new and creative technologies, such as water reuse. This must be done with a focused pursuit of identifying unintended consequences while also creating incentives for the successful implementation of such practices.

Fourth, this plan should be used as a tool to facilitate intrastate and interstate regional cooperation. Such cooperation—particularly as it relates to infrastructure—must enable continued cooperative arrangements among water utilities, as well as increase agency collaboration and coordination at all levels.

Fifth, while proactively seeking to avert the potential crisis that Tennessee may face in available water, equal attention must be given to the critical need of a diminishing workforce charged with the maintenance, security, and growth of our infrastructure investment. The state is quickly reaching the disturbing point of not having a sufficient number of operators to protect, manage, and maintain these systems in the future.

Finally, educating the public will ultimately serve as the foundation for this plan's successful implementation. Water truly has a value that has been taken for granted in many sectors of our state. This plan provides the opportunity to serve as the springboard for educational outreach to all age groups of our state.