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Water works: muni bonds finance a sustainable future

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Reliable water quality and supply are vital to U.S. communities facing aging infrastructure and the growing impacts of climate change. Municipal bonds, especially water revenue bonds, offer sustainable financing for critical upgrades while providing attractive return potential for investors. These investments strengthen public health, boost community resilience and help preserve essential water resources for the safety and well-being of future generations.

BY THE NUMBERS

- 148,000: approximate number of U.S. public water systems.[1]
- 2.2 million: miles of transmission and distribution lines maintained.[2]
- $1.2 trillion: investment needed in the next 20 years to address aging water and sewer infrastructure.[3]
- 9.2 million: lead service lines in the U.S. (9.0% of the total).[4]
- $300 billion: water and sewer revenue bonds outstanding; $28 billion in new money bonds issued in 2024.[5]
- 751 days: median days' cash on hand for water and sewer credits in 2024. Median rating and debt service coverage: A+ and 2.73x.[6]

MUNI BONDS OFTEN FUND LARGE-SCALE CAPITAL PROJECTS

Most people in the U.S. assume clean water will be available on demand from the taps in their homes and plentiful enough for them to fill their swimming pools and water their plants.

Water systems financed with municipal bonds are responsible for sourcing, sanitizing and delivering clean water to people across the country every day. Muni bonds often fund large-scale capital projects that keep water utilities running and drinking water safe.

Local governments issue water revenue bonds to raise funds for long-term, capital-intensive projects, such as replacing miles of deteriorating water lines, upgrading water treatment facilities and enhancing or extending water transmission systems. These critical projects generally have a lifespan of 20 to 50 years or more. As such, bond repayment and debt service are appropriately structured over a longer period, often up to 30 years.

ESSENTIAL SERVICE BONDS PRODUCE RELIABLE CASH FLOWS

Water revenue bonds help finance an essential public good while providing investors with steady cash flows. It is crucial for individuals and businesses to have reliable access to clean water, and demand does not fluctuate significantly during economic downturns.

In the current environment, water bonds offer a stable and defensive investment opportunity. Water systems are minimally impacted by tariffs and would not be materially affected by a potential economic downturn. These systems are monopolistic, essential service providers with strong bondholder security, making water revenue bonds attractive for investors looking for capital preservation with relatively lower risk.

WATER SUPPLY AND SAFETY NEEDS SHOULD SUSTAIN BOND ISSUANCE

U.S. water systems face two principal challenges both now and in the future. Water scarcity plagues certain areas in the West and Southwest, mostly due to rising temperatures, worsening drought conditions and water pipe leakage.

The second concern is water safety, which may be exacerbated by aging infrastructure in the Northeast, Southeast and Midwest. Aging systems can pose serious public safety risks, from frequent water main breaks to lead contamination and waterborne diseases. The U.S. Environmental Protection Agency (EPA) estimates that the water and sewer sector will require up to $1.2 trillion in investment over the next 20 years to address aging infrastructure. Much of this will be financed by municipal bonds.

Figure 1: Muni bonds finance water and sewer projects

Largest water revenue bond issuers

Issuer	State	Total debt outstanding ($ billions)	Senior lien rating (Moody's/ S&P/Fitch)	Debt service coverage, FY24 (x)	Debt service coverage, 5-year average (x)	Days' cash on hand	Long-term debt to net fixed assets ratio (%)
New York Municipal Water Finance Authority	NY	34.77	Aa1/AA+/AA+	1.20	1.49	374.4	101.9
Los Angeles Dept. of Water and Power	CA	7.35	Aa2/AA-/AA	1.66	1.76	200.9	65.0
Metropolitan Water District of Southern California	CA	3.82	Aa1/AA+/AA+	1.07	1.61	128.4	35.4
Massachusetts Water Resources Authority	MA	4.16	Aa2/AA/AA	1.11	1.16	263.3	76.0
San Francisco Public Utilities Commission	CA	5.17	Aa2/AA-/NR	1.03	1.12	371.1	89.5

Data source: CreditScope Data, 21 May 2025.

A CHANGING CLIMATE TESTS THE SUPPLY/DEMAND BALANCE

A warming climate increases the need for water and decreases supply. Warmer temperatures speed rates of evaporation and alter precipitation patterns, which are expected to worsen droughts. Drought risk has been an especially persistent and long-term credit challenge in the West and Southwest.

The **Colorado River Basin** has faced persistent drought for the past 25 years. The Basin supplies water to nearly 40 million people across seven states and irrigates 5.5 million acres of farmland. Operating guidelines governing water allocation expire in 2026 and are being renegotiated. If a consensus is not reached by August 2026, water utilities in the seven Colorado River states (AZ, CA, CO, NV, NM, UT and WY) could experience significant uncertainty and potentially insufficient supply.

The **Southern California Metropolitan Water District** (Metro Water) is currently impacted by insufficient water allocations from the Colorado River Basin due to ongoing droughts. Metro Water serves 19 million people across six counties and relies on the Lower Colorado River Basin for about 30% of its supply.

Because of this supply constraint, Metro Water plans to build a $3.4 billion water recycling plant to reuse treated wastewater and help ensure sustainable water availability for the region. In partnership with the Los Angeles County Sanitation District, Metro Water has already accumulated $1.6 billion in funds for the recycled water project and plans to finance the remainder with a mix of internal funds, federal and state grants and municipal bond issuance.

INNOVATIVE SOLUTIONS HELP MEET SUPPLY NEEDS

Water systems are searching for groundbreaking solutions to address ongoing supply concerns through water recycling projects, as well as plans for conservation and desalination.

SUCCESS STORY: SANTA FE WATER SYSTEM

The City of Santa Fe, New Mexico, has faced severe drought conditions for more than 20 years. In 2021, the city issued $20 million in water revenue bonds to fund a comprehensive capital upgrade plan. Bond proceeds financed the installation of an advanced metering infrastructure (AMI) that could detect leaks in real time and bill customers more accurately. The bonds also funded pipeline rehabilitation projects and updated the city's aging water treatment plants.

Upgrades to Santa Fe's reclaimed water treatment plant enabled the city to double its capacity to deliver non-potable water for irrigation across parks, schools and public landscaping. This allowed the city to direct the remaining potable water to households and significantly improve water availability across the service area.

These improvements have already substantially decreased water loss and consumption per household, positioning Santa Fe as a regional leader in sustainable water and drought management. In the next five years, the city plans to use its improved infrastructure to strengthen aquifer recharge stations (where water infiltrates the soil toward an underground storage station) and improve connectivity across the entire system.

Santa Fe's recent experience shows how a relatively modest but targeted $20 million investment can bolster a community's access to water, deliver lasting environmental change and support positive public health outcomes even in the driest parts of the U.S.

The **Southern Nevada Water Authority** (SNWA), for example, has issued municipal bonds to fund water conservation programs in the Las Vegas Valley. SNWA's program aims to reduce the overall water demand by AMI, upgrading pipes and paying for turf removal incentives. The success of its conservation program means the SNWA will be able to proactively navigate lower water allocations from the Colorado River Basin.

Similarly, the **San Diego County Water Authority** (SDCWA) issued bonds to finance part of a $1 billion project to build the Lewis Desalination Plant, which was completed in 2015. The Lewis Plant is one of the largest seawater desalination facilities in the world, providing 50 million gallons of treated water per day to San Diego and its surroundings. Although costlier than most water treatment facilities, desalination plants can provide a reliable and drought-resilient source of clean water to help ensure long-term water security.

PROTECTING WATER QUALITY IS A PRIORITY

Safe and clean drinking water is a priority for all communities across the U.S. When local water is unsafe, it poses significant risk to the population and generates national headlines. Recent water quality issues in Flint, MI; Jackson, MS; and Houston, TX, have illustrated how devastating poor water quality can be for impacted communities.

Several new water quality regulations finalized by the EPA in 2024 will require significant capital investment and impact water utility management for years to come. One new rule limits the concentration of PFAS (per- and polyfluoroalkyl substances, also known as forever chemicals) in drinking water.

About 15% of U.S. utilities are expected to be impacted and will need to invest in new filtration technology, provide resources to educate communities about PFAS and close contaminated wells and other compromised water sources. The implementation cost is estimated between $45 billion and $90 billion.

Despite a recent trend of deregulation and federal cost cutting, the EPA has indicated rules governing PFAS pollutants will continue to be implemented, though certain compliance deadlines will likely be extended.

Newly strengthened rules on lead and copper limits will also require communities to eventually replace all lead service lines. Cost estimates range between $20 billion and $30 billion across the sector. However, the impact across the country is far from uniform, primarily impacting communities in the Midwest and Northeast.

For example, an estimated 400,000 homes and two-flat residences in Chicago, IL, should have lead service lines replaced. Cost estimates range widely from $6 billion to $10 billion, and it could take the city decades to address the issue. Cleveland, OH, has an estimated 230,000 lines to be replaced, while other cities do not have this issue at all.

Capital costs to implement these EPA regulations will be financed by a combination of local, state and federal sources. The Bipartisan Infrastructure Law passed in 2021 provided approximately $10 billion in funding to help states and municipalities combat PFAS and other water pollutants, but much of the cost will fall to rate payers and increase monthly utility bills. Spending to comply with EPA rules provides assurance that municipalities are providing cleaner water and are actively monitoring contaminants, but larger capital demands may weaken credit quality.

The current administration in Washington is expected to lessen regulation on water systems, which could lead to fewer mandated capital upgrades or longer runways for implementation. However, debt issuance is expected to remain robust as systems meet the needs of the communities they serve.

STRONG BONDHOLDER SECURITY PROVISIONS SUPPORT FAVORABLE RATINGS

Significant capital needs mean investors should expect water and sewer bond issuance to remain steady over the long-term. Water revenue bonds

can be issued as obligations of municipalities or from stand-alone utility systems paid from the net revenues of the water system. After meeting operating and maintenance expenditures, residual revenues are pledged to bondholders.

Because water revenue bonds are secured by revenues derived from an essential service and benefit from strong legal covenants, they are generally highly rated. Moody's rates approximately 1,500 water and sewer utility systems with a median rating of Aa3/Stable.

Standard legal provisions include a rate covenant setting a minimum level of debt service coverage that the system must target when setting customer rates. Most water systems can independently set and adjust customer rates as needed.

For example, **East Bay Municipal Utility District** in the San Francisco Bay area has an automatic rate escalation mechanism determined by CPI and infrastructure investment needs. Many utilities enact automatic rate increases annually without having to obtain voter approval. Rate-setting autonomy ensures revenues are adequate to meet operating expenses and debt service coverage covenants.

Other common bond security protections include limits on how far pledged revenues can be leveraged (an additional bonds test) and requirements for debt service reserve funds sized to maximum debt service to be available if pledged revenues ever fall short.

Capital projects are most often funded with a combination of revenue bonds and low interest loans from state-sponsored revolving loan funds.

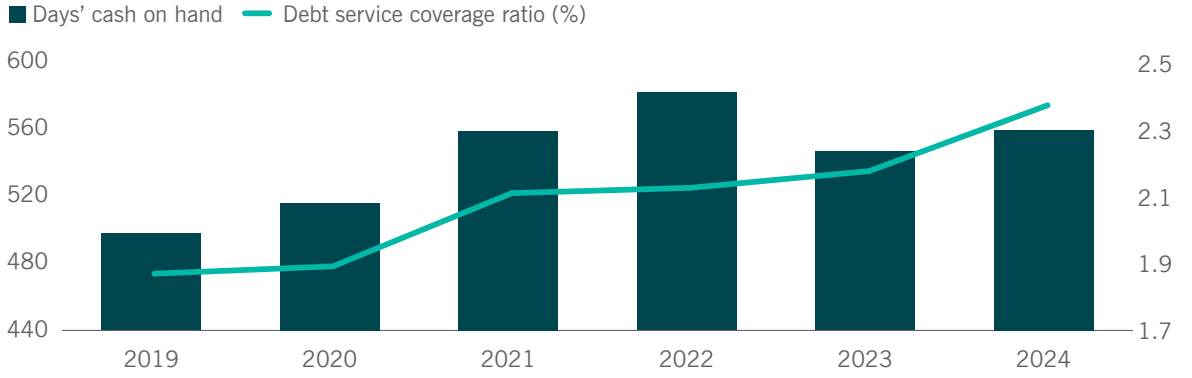
INVESTMENT CONSIDERATIONS INCLUDE SEVERAL FACTORS

When evaluating water system revenue bonds, investors consider the fiscal health of the utility, debt levels and broader economic factors that will impact the issuer's ability to repay debt.

Financial strength is measured by system liquidity reflected in days' cash on hand, and the adequacy of revenues to service annual debt payments, measured by a debt service coverage ratio.

Leverage, measured by comparing total debt outstanding with a system's fixed assets (property, plant and equipment), provides a relative measure of debt affordability and the capacity to finance additional capital infrastructure. Significant future capital demands or debt issuance plans factor into a utility's credit profile.

Figure 2: Water and sewer utilities offer investors strong financial profiles



Data source: CreditScope Data, 24 Feb 2025.

Investors are keen to understand the service area's socioeconomic and demographic profile, water rate affordability compared with household income levels, and the prospects for future growth. Lastly, compliance with all federal and state environmental regulations is a key credit factor. Non-compliance could result in poor water quality, as well as costly fines and consent decrees mandating long-term projects to remediate any violations.

Days' cash on hand and debt service coverage improved in fiscal year 2024 relative to 2023 (Figure 2), which could be attributed to monthly rate increases, lower interest payments due to refunding and improvements in cost efficiencies across water systems.

AN INVESTMENT THAT BENEFITS COMMUNITY RESILIENCE AND HEALTH

Reliable water quality and adequate supply are crucial to ensuring a bright future for communities across the U.S. As aging infrastructure and climate change deepen existing challenges, municipal bonds offer a unique opportunity to finance sustainable solutions to provide clean drinking water and proactively tackle drought conditions.

Water revenue bonds provide a reliable investment opportunity for bondholders while also fostering community resilience and improving public health outcomes. As such, investing in municipal bonds can be a catalyst in preserving the vital resource of water and protecting the health and safety of future generations.

MUNI BONDS CONNECT WITH AMERICANS' LIVED EXPERIENCE

The Nuveen Munis in Your Community series explores the connection between effective muni bond investing and Americans' lived experience. Nuveen's muni credit analyst team — one of the industry's largest and longest tenured — constantly assesses the impact of the trends that influence muni credit quality across all market sectors.

Municipal bonds are a foundational element in Nuveen's proud heritage of investing to support public purpose — and an asset class that touches the everyday lives of all Americans. Munis fund essential infrastructure for state and local government: K-12 schools, colleges and universities; roads and airports; hospitals; water and sewer utilities; housing and more.

Our research identifies what we believe are attractive investment opportunities. It also yields practical insights into what individuals can expect when it comes to the availability, operation and cost of services used daily – things like the price of an airline ticket or a hospital visit, the health of regional transportation options, the quality of local school systems or the dependability of critical utilities.

For more information, please visit nuveen.com.

Endnotes

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