U.S. Water and Sewer Rating Criteria

Sector-Specific

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This report updates and replaces "U.S. Water and Sewer Rating Criteria," dated Nov. 29, 2018.

Scope

This criteria report details Fitch Ratings' methodology for assigning Issuer Default Ratings (IDRs), Standalone Credit Profiles (SCPs), and issue- and obligation-specific ratings to U.S. municipal water and sewer (including wastewater and stormwater) utilities, whether operating as a stand-alone legal entity or an enterprise of a local government. This rating methodology also applies to certain municipally owned combined utilities, for which water and sewer revenue accounts for, or is expected to account for, the largest share of total revenue on an ongoing basis.

Ratings under these criteria will be evaluated in conjunction with Fitch's "U.S. Public Finance Tax-Supported Rating Criteria" for utilities that are not stand-alone legal entities to determine if the utility rating is limited by the local government IDR. Furthermore, ratings under these criteria may also be applied in conjunction with the "U.S. Public Finance Tax-Supported Rating Criteria" to tax-supported water and/or sewer utilities, for which the issue or obligation rating is constrained by the operating risks reflected in the IDR of either the utility or local government. The criteria apply to both new and surveillance ratings.

Key Rating Drivers

Fitch does not explicitly weight the assessments of individual key rating drivers in determining its overall rating. There is no standard formula to link the following inputs into an exact rating. The individual assessments inform, but do not dictate, the final rating outcome. The relationship between individual and aggregate qualitative and quantitative factors varies between entities in the sector. As a general guideline, where a material factor is significantly weaker or stronger than others, this factor tends to attract a greater emphasis in the overall analysis.

Revenue Defensibility: This entails analysis of the ability of a utility to generate cash flow based on its legal framework and the fundamental economics of the service area. Fitch will evaluate demand and pricing characteristics that influence revenue volatility and the tools available to the utility to respond to fluctuation in demand.

Operating Risks: This entails analysis of the utility's operating profile, including predictability and volatility of costs, life cycle/capital renewal risks, key resource cost risks and the ability to manage growth in costs over time.

Financial Profile: This entails analysis of a utility's liquidity profile and leverage in the context of its overall risk profile. These metrics are evaluated on both a historical and forward-looking basis, which considers an individual utility's overall financial flexibility to withstand a stress scenario through a five-year horizon.

Asymmetric Additive Risk Considerations: Risk factors, such as debt structure, management and governance, legal and regulatory, are also considered when assigning a rating. These risk factors are not scaled, and only weaker characteristics affect the rating.

Related Criteria

Public Sector, Revenue-Supported Entities Rating Criteria (March 2020)

U.S. Public Finance Tax-Supported Rating Criteria (March 2020)

U.S. Public Finance State Revolving Fund and Municipal Finance Pool Program Rating Criteria (September 2019)

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General Credit Quality Reflected in IDR or SCP

Fitch will assign an IDR to water and sewer enterprises that are determined to be separate municipal entities for purposes of filing bankruptcy under Chapter 9 of the U.S. Bankruptcy Code (the Code), as well as an issue-specific rating for each Fitch-rated security. Enterprises that are related to municipalities will instead be assigned a Standalone Credit Profile (SCP). Assigning IDRs and SCPs aligns default risk ratings in this sector to those assigned by other groups across Fitch's global rating platform. Conduit issuers, including issuers that benefit from balanced, pass-through contractual frameworks, will not be assigned IDRs or SCPs.

For more information on IDRs, SCPs and rating distinctions between specific securities, see Fitch's master criteria "Public-Sector, Revenue-Supported Entities Rating Criteria" and "U.S. Public Finance Tax-Supported Rating Criteria."

Sector Risk Profile

Monopoly Providers

The starting point for analysis of municipal water and sewer utilities is recognition that the sector's business model and fundamental credit strengths reduce volatility of financial performance and mitigate the effects of macro events on the underlying utility. These strengths include relatively stable demand driven by the essentiality of water and sewer services, mandates to serve well-defined areas with monopolistic characteristics, strong contractual frameworks and considerable pricing flexibility provided through the sector's largely autonomous rate-setting authority.

Rate-Setting Autonomy

An overwhelming majority of Fitch's rated water and sewer utility systems possess the ability to autonomously determine their rates for service, free from the oversight of state utility regulatory commissions. With such powerful pricing flexibility at hand, the governing body's actual use of its rate-making authority strongly influences revenue, profitability, operating liquidity and overall credit quality.

Although exempt from rate regulation in most jurisdictions, municipal water and sewer utilities remain subject to a myriad of state and federal regulations related to asset and resource planning and environmental standards. Changes in market dynamics, regulatory initiatives or political influence, whether implemented or expected, can affect both revenue defensibility and operating risk throughout the sector as a whole, and may introduce positive or negative rating pressure for specific credits.

Not-for-Profit Business Model

Public water and sewer utilities operate on a not-for-profit basis and with the fundamental mission of providing safe, reliable and affordable water and sewer services. Excess cash flow is typically retained and used to build financial cushion, fund capital investment or reduce borrowings, although a portion of net revenues may be returned to host municipalities through transfers.

Given the balance of these fundamentals, ratings in this sector, in most cases, range from 'AAA' to 'A–' (with a current median rating of AA), denoting high credit quality. However, individual utilities can be assigned lower, even speculative-grade (BB category and below), ratings due to specific credit features or issues. This sector risk profile range does not establish a rating floor or ceiling, and does not simply replicate the range of existing ratings in the sector. Rather, the range emerges from the core features common to U.S. public water and sewer utilities.

Functional Responsibilities Establish Foundation

Although the water and sewer sector enjoys a strong overall risk profile, Fitch believes the assessment of utility-specific risks and credit quality begins with a solid understanding of the utility's functional responsibilities. The water and sewer sector is highly segmented. While some utilities are engaged in all aspects of the water supply, treatment and distribution as well as sewer collection, treatment and

Glossary of Terms

CAGR – Compound annual growth rate.

Capex – Capital expenditures.

CIP – Capital improvement plan.

COFO – Coverage of full obligations.

CP – Commercial paper.

DB – Defined benefit.

DSC – Debt service coverage.

EBITDA – Earnings before interest, tax, depreciation and amortization.

ERISA – Employee Retirement Income Security Act.

FADS – Funds available for debt service.

FASB – Financial Accounting Standards Board.

FAST – Fitch Analytical Stress Test.

GASB – Governmental Accounting Standards Board.

IDR – Issuer Default Rating.

MG – Million gallons.

NPL – Net pension liability.

OPEB – Other post-employment benefits.

PCI – Purchaser credit index.

PCQ – Purchaser credit quality.

PSM – Portfolio stress model.

disposal, others may have functional responsibilities that are limited to individual roles. For example, some utilities may be solely responsible for the distribution of water to end users, purchasing their water supply from a third party, while others may only be responsible for procuring and treating wholesale water supply for delivery by other systems. Fitch considers both the statutory and contractual obligations of each utility, as well as the degree to which risks are shared or mitigated, to establish the framework under which rating factors are assessed.

Retail Systems

Fitch considers retail water and sewer utilities to be those whose primary purpose is to provide water and sewer service to residential, commercial and industrial (including irrigation customers) end users, regardless of the amount of revenues generated from wholesale services. While some municipal water and sewer utilities are independent entities, most are owned by the municipalities they serve and operate as closely integrated enterprise funds of the local government. Moreover, municipal water and sewer utilities may be operated as part of a combined utility system that provides other services, including retail solid waste, hydroelectric, etc.

When evaluating retail water and sewer utilities, Fitch considers how the utility's water supply and treatment and/or sewer treatment and disposal requirements are met. Some retail utilities manage all aspects of their business through the ownership and operation of facilities. Others receive water supplies and/or services from wholesale utilities. Fitch considers the risks, benefits and financial obligations of both approaches in its analysis.

Wholesale Providers

Fitch considers wholesale utilities to be those whose primary purpose is to provide water and sewer service to retail utilities, regardless of the amount of revenues generated from retail services. Fitch's evaluation of wholesale water and sewer providers is rooted in its analysis of the contractual responsibilities and obligations of the provider and its purchasers. Most wholesale providers are organized to provide all or a portion of their members' water supply and/or sewer treatment and disposal requirements pursuant to long-term contracts. Fitch considers the terms, tenor and conditionality of the contractual obligations (i.e. take-or-pay; take-and-pay) to understand the risks borne by each party and to determine the context for assessing the rating factors.

Fitch also considers the counterparty risks associated with the contract structure in its evaluation, factoring the operational interdependency and governance relationship between the wholesale provider and its purchasers, in addition to purchaser credit quality. In some contractual frameworks where revenues and costs are largely balanced via pass-through charges to purchasers — particularly single-asset projects — purchaser credit quality may be more of a consideration in the final rating than the wholesaler's financial profile (see Appendix B).

Key Rating Drivers — Retail Water/Sewer Utilities

		aa	a	bbb	bb
Revenue Defensibility					
Revenue Source Characteristics	Characterization	Nearly all revenue is derived from services or business lines exhibiting monopoly characteristics. Reliance on revenue from competitive sources is insignificant.	A significant portion of revenue is derived from services or business lines exhibiting monopoly characteristics. Reliance on revenue from competitive sources is manageable.	The majority of revenue is derived from services or business lines exhibiting monopoly characteristics. Reliance on revenue from competitive sources is meaningful.	Less than 50% of revenue is derived from services or business lines exhibiting monopoly characteristics. Reliance on revenue from competitive sources is significant.
	General range of revenue derived from monopoly business lines	Over 95%	Over 80% to 95%	Over 50% to 80%	50% and less

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Key Rating Drivers — Retail Water/Sewer Utilities

		aa	a	bbb	bb
Service Area Characteristics	Characterization	Very favorable demographic trends generally characterized by strong customer growth, above-average income levels and low unemployment rates.	Favorable demographic trends generally characterized by average customer growth, with average income levels and average unemployment rates.	Stable demographic trends generally characterized by little or no customer growth, and below-average income or above-average unemployment rates.	Weak demographic trends generally characterized by a declining customer base, well below-average income or high unemployment rates.
Rate Flexibility	Characterization	Independent legal ability to increase service rates without external approval.	Legal ability to increase service rates is subject to approval of external authorities. History and expectation of operating and capital costs being recovered on a timely basis are strong.	Legal ability to increase service rates is subject to approval of external authorities. History and expectation that operating and capital costs may not be recovered on a full or timely basis.	Legal ability to increase service rates is subject to approval of external authorities. History and expectation that operating and capital cost recovery will be neither full nor timely.
		Utility costs are affordable for the vast majority of customers.	Utility costs are affordable for most customers but are high for a large segment of customers.	Utility costs are high for a significant portion of customers.	Utility costs are high for an exceedingly large number of customers.
	General range of population percentage whose total water-related bill exceeds 5% of household income or individually 2.0% (water), 2.5% (sewer) and 0.5% (stormwater)	20% or less	Over 20% to 30%	Over 30% to 40%	Over 40%
Asymmetric Rating Driver Considerations	Concentration of revenues from individual customers above 10% or over 25% for the largest 10 customers, industry concentration, tax revenue volatility, weak wholesale contract structures and counterparty risk are negative considerations.				
Operating Risks					
Operating Cost Burden	Characterization	Very low operating cost burden.	Low operating cost burden.	Midrange operating cost burden.	High operating cost burden.
	General range of average annual mg of water produced and/or sewer flows treated	$6,500/mg or less Stormwater assessed at 'aa' unless evidence to suggest otherwise	Over $6,500/mg to $9,500/mg	Over $9,500/mg to $12,500/mg	Over $12,500/mg
Capital Planning and Management	Characterization	Moderate life cycle investment needs supported by adequate capital investment.	Elevated life cycle investment needs but supported by adequate capital investment.	Elevated life cycle investment needs with weak capital investment.	Elevated life cycle investment needs with extremely weak capital investment.
	General range of life cycle ratio	45% or less	Over 45% and capital spending averages 80% or more	Over 45% and capital spending averages 40% to 80%	Over 45% and capital spending averages 40% or less
Asymmetric Rating Driver Considerations	Meaningful supply or resource-management concerns, project completion risk and counterparty risk are negative considerations.				

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Key Rating Drivers — Retail Water/Sewer Utilities

		aa	a	bbb	bb
Financial Profile					
Leverage Profile	(Net adjusted debt to adjusted FADS)	Refer to the *Rating Positioning* table on page 18.			
	(Other considerations)	Leverage capacity may be increased depending on capital expenditures relative to position in capital life cycle; rate recovery mechanisms that limit revenue volatility; or revenue sources or structures capable of meaningfully enhancing existing revenues or limiting operating risk exposures.			
Liquidity Profile	(COFO ratio)	Generally less than 1.0x from available revenues and/or revenues excluding connection fees is a constraining factor but may be mitigated with around 120 days or more of current cash available.			
	(Liquidity cushion ratio)	Generally less than 90 days total or less than 30 days current cash available is a constraining factor.			
Asymmetric Additional Risk Considerations	Debt structure and contingent liability, management and governance, legal and regulatory, information quality, and rating relationship to the host government characteristics that are significantly outside the norm for the sector are factored into the final rating.				

COFO – Coverage of full obligations. FADS – Funds available for debt service. mg – Million gallons.

Three Key Rating Drivers

Fitch's three key rating drivers are revenue defensibility, operating risks and financial profile.

For retail public water and sewer utilities, as well as certain other water-related utilities that are not considered wholesalers, the three key rating drivers are assessed using the following guidance, which outlines general expectations for a given rating category. Guidance related to wholesale utilities is outlined in Appendix B. The subfactors composing each rating driver highlight the components most critical to making the assessment. All assessments are grounded in utility-specific historical data and qualitative analysis to support a forward-looking view on the expectation for future performance, rather than at a single point in time. Key rating driver and subfactor assessments may therefore reflect the consideration of metrics based on historical averages, estimates and/or trends. Moreover, assessments may on occasion differ from what the metrics imply based on the analyst's knowledge of other facts and circumstances. Where assumptions differ from standard assumptions that result in assessments that differ from implied metrics or the *Rating Positioning* table's suggested analytical outcome, these will be communicated in Fitch's rating action commentary.

The correspondence of revenue defensibility, operating risks, financial profile and ratings is presented in the *Rating Positioning* table on page 18. The ratings are not formulaic or model driven, but require qualitative judgment to place metrics in an overall context for each utility.

Revenue Defensibility

Fitch considers both demand and pricing characteristics in its assessment of revenue defensibility. Water and sewer utilities have broadly stable demand characteristics, but exhibit some volatility across the typical economic and business cycle. Base demand for water and sewer service is somewhat insensitive to external factors given the essentiality of service and absence of a competitive marketplace. However, demand fluctuation on the margin is sensitive to changes in regional economics and demographics, as well as weather conditions.

In its assessment of revenue defensibility, Fitch analyzes the historical patterns of revenue performance through economic and investment cycles, as well as growth trends over time, taking into account the utility's revenue mix, customer characteristics, contractual framework, the economic underpinnings of its service area, and its capability to preserve revenue generation through rate increases. While weather is among the most significant factors driving variability in demand for water service, particularly for residential users, normal fluctuations in temperature and seasonality are considered in the context of a utility's normal business cycle in Fitch's scenario analysis and are unlikely to affect Fitch's assessment of revenue defensibility.

Revenue Source Characteristics

Retail water and sewer utilities typically exhibit strong revenue source characteristics as most, if not all, of their revenue (including charges, taxes and assessments) is directly or indirectly derived from monopolistic services: providing water and/or sewer service to end users within defined areas that are not subject to competitive pressures. Fitch views revenue derived from monopolistic business lines to be more durable, secure and supportive of strong revenue defensibility than revenue generated by competitive activities.

Combined utility systems also derive revenues from other essential utility services, including public power and natural gas, which are similarly monopolistic. Wholesale services provided to other retail utilities exhibiting monopolistic characteristics through either long-term contracts (minimum tenor of two years) or in situations where such purchasing retailer has no perceived viable and/or economic alternative to the wholesale service provided are also considered to exhibit monopolistic characteristics.

Revenue Source Characteristics

Metrics to Support Assessment

- Fitch assesses revenue risk through an analysis of a utility's business lines and the related revenue relied on to support both operations and debt service. Generally, retail utility systems that derive more than 95% of operating income from services or business lines exhibiting monopolistic characteristics have revenue source characteristics consistent with a 'aa' factor assessment; over 80% to 95%, 'a'; over 50% to 80%, 'bbb'; and 50% and less, 'bb'.
- Fitch may also consider in its assessment, if available, each business line's contribution to total income and FADS using the thresholds outlined above.

Water and sewer utilities may also derive revenue from non-utility services or less traditional business lines subject to varying degrees of competitive pressures on both demand and price. These services may include agricultural water sales, competitive energy supply and uncontracted or short-term (less than two years) off-system energy sales as well as certain solid waste services. Revenue defensibility risk to a utility can be affected by the degree of the competition of such business lines as well as the extent to which the utility relies on such revenues and income to meet its covenanted revenue requirements and debt service obligations, if such situations occur.

In cases where a retail water and sewer utility derives more than 20% of its revenue from competitive or non-utility service/less traditional business lines, Fitch may also consider in its analysis whether the off-taker(s) has the reasonable ability to procure related service elsewhere, as well as the tenor, counterparty and terms of relevant contracts to assess the degree to which replacement funds — either from replacement contracts or retail rate increases — may be necessary to meet scheduled debt payments. Contracts with weak counterparties, tenors of less than two years and termination provisions may subject a utility to contract renewal risk or merchant risk, and lower revenue defensibility.

Service Area Characteristics

A water and sewer utility's demand and pricing characteristics, as well as its overall revenue stability, will be highly influenced by its service area characteristics and demographic trends since the essentiality of the enterprises' services provides localities with a de facto ability to charge for their provisions. Retail customer growth, elevated income levels, a strong and diverse employer base, and low unemployment levels are all positive credit factors that can influence both demand and pricing characteristics. Service areas characterized by strong employment metrics and income levels are more likely to benefit from stronger demand driven by customer in-migration, as well as organic growth. Moreover, stronger income levels throughout an area are likely to result in more inelastic demand and rate flexibility during periods of economic weakness. Areas experiencing declining customers and employment are more likely to experience lower service demand.

Service Area Characteristics

Metrics to Support Assessment
• Strong economic, customer and demographic trends support strong revenue defensibility. Fitch analyzes representative customer growth rates and service area unemployment rates and income levels relative to national levels. – Utilities that experience a historical compounded average annual growth in customers (typically over a five-year period) of more than 1.5% exhibit stronger growth characteristics; 1.5% to 0.0%, midrange; and less than 0.0%, weaker. – Service areas that report median household income in excess of 125% of the national median exhibit stronger income characteristics; 125%–75%, midrange; and less than 75%, weaker. – Service areas that report unemployment rates that are less than 75% of the national average exhibit stronger employment characteristics; 75%–125%, midrange; more than 125%, weaker. • Markets that exhibit positive retail customer growth and average to slightly below-average demographic trends are considered strong and consistent with factor assessments of at least 'a'. Markets that experience a declining retail customer base and exhibit well below-average demographic trends are considered weak and consistent with a factor assessment of 'bb'.

Fitch reviews income and employment indices of the representative service territory to help assess not only the prospects for stronger growth and more inelastic demand, but also the capacity of residential users to meet current obligations and absorb future rate increases. While income also provides some indication of an end user's ability to pay utility bills, Fitch has observed that the essential nature of water and sewer service and the remedies available to most utilities (i.e. shutoffs and liens) make payment delinquencies in the sector extremely low, regardless of income levels and other economic indicators.

Rate Flexibility

The final component of the revenue defensibility assessment is a utility's rate flexibility, which considers both the utility's independent legal ability to determine rates for service and its relative affordability based on a benchmark of 5% of household income for all water-related services, or, in some cases, its price competitiveness.

Assessing a utility's independent legal ability to determine rates and increase operating revenue involves consideration of any limits on the utility's autonomy in this area, including requirements for approval from local government groups or state regulatory commissions. Fitch considers a utility system to have independent legal rate-raising ability as long as such action is at the discretion of the utility's governing body — be it a board of directors, local government council/commission or both.

Utilities whose rates for service must be approved by an external regulatory authority are viewed as having less rate flexibility. Although utilities operating within a well-established and historically supportive regulatory regime may exhibit strong financial performance and credit quality, their revenues are nonetheless subject to scrutiny, regulatory lag and the potential for cost disallowance. Fitch will consider in its assessment historical rate-making decisions, methodologies and recovery mechanisms to determine the likelihood costs will be recovered in a timely manner.

A utility system's ability to independently set rates for service significantly enhances revenue defensibility, allowing the utility to increase revenue as necessary to offset the effects of lower unit sales or meet unanticipated cost increases. However, Fitch believes a governing body's capability to exercise its rate-making authority and sustain strong financial performance can be influenced to a large degree by the resulting residential cost of service to the most economically vulnerable ratepayers given the essentiality of water and sewer service to public health and safety. Consequently, the rate flexibility component is capped by the affordability assessment.

Fitch assesses affordability by calculating the approximate percentage of the population for which combined utility charges (consisting of water, sewer and stormwater) exceed 5% of household income based on a straight-line interpolation of household income quintiles produced by the U.S. Census Bureau for the representative service territory. Alternatively, Fitch may base its calculation on

individual or combined charges where one or more of the costs of service are unknown or not applicable using a threshold of 2.0% for water, 2.5% for sewer and 0.5% for stormwater.

Affordability

Metric to Support Assessment
• Fitch calculates an affordability rate to determine the number of people whose bill accounts for an outsized portion of their income. Generally, a combined water-related bill that is greater than 5% of household income (or individually, 2.0% for water, 2.5% for sewer and 0.5% for stormwater) is considered unaffordable. Utilities with 20% or less of their population whose bills are considered high are deemed to have an affordability assessment factor of 'aa'; over 20% to 30%, 'a'; over 30% to 40%, 'bbb'; and over 40%, 'bb'.

In measuring utility charges, Fitch assumes a monthly residential bill based on 7,500 gallons of water consumption and/or 6,000 gallons of sewer flows. Stormwater charges will be based on the monthly charge of either the service area's established equivalent residential unit, average residential charge or a 2,000-square foot calculation of impervious cover, whichever is deemed relevant.

Retail utilities that possess the legal ability to determine rates and provide affordable utility service to the vast majority of the most economically vulnerable customers are viewed as having ample rate flexibility. In determining its final assessment of affordability, Fitch may deviate from the assessment implied by the metric if Fitch believes features of the service or service territory, such as assistance programs, governmental housing, multifamily master meters, etc. appear to significantly diminish the effect of utility charges to economically vulnerable customers.

For utilities whose business model is more susceptible to competitive pressures and where Fitch's measurement of affordability may not be the best reflection of ultimate revenue-raising flexibility, such as agricultural irrigation districts, Fitch may use other quantitative and/or qualitative information to assess overall affordability, including relative price burden and importance of available water supplies.

Asymmetric Rating Factor Considerations — Revenue Defensibility

In addition to the aforementioned considerations, the assessment of revenue defensibility can be constrained by revenue source concentration and tax revenue volatility, where applicable. Fitch evaluates tax revenue volatility consistent with its "U.S. Public Finance Tax-Supported Rating Criteria," while Fitch evaluates a utility's vulnerability to sudden drops in demand and the impact on revenue defensibility by assessing the degree to which demand and revenue rely on a particular customer, industry or commercial segment, where available. Customer concentration is assessed by reviewing the revenue contribution from a utility's largest customers.

Utilities that derive more than 10% of operating revenue from their largest customer or more than 25% of operating revenue from their 10 largest customers exhibit meaningful customer concentration. Utilities exhibiting customer concentration will be further evaluated to determine whether individual customer risk detracts from revenue stability. For example, revenue stability will be viewed as greater for a utility whose dominant customer is a university or medical center, than a utility dominated by a manufacturing facility or industrial complex.

Operating Risks

The second key rating driver is operating risks, which focus on operating cost burden and capital planning and management. A water and sewer utility's ability to generate adequate margins while preserving affordability or cost competitiveness is largely a function of its ability to effectively manage operating and capital expenses. Long-term investment in property, plant and equipment is necessary to ensure sectorwide resource adequacy, regulatory compliance, accurate revenue recognition, reliability and efficient operations. While capital expenditures (capex) may limit financial flexibility in the near term, investment is essential for ensuring strong utility performance over the long term.

Operating Cost Burden

Fitch believes water and sewer utilities with a high operating cost burden generally are subject to a higher degree of overall operating risk. The measurement of total operating costs reflects the wide range of individual costs associated with supply, treatment and delivery of water as well as collection, treatment and disposal of wastewater. These include purchased water and/or sewer services, labor, administration, maintenance and fixed assets (as measured by depreciation). Fitch also includes net transfers in its calculation of operating costs. Overall, Fitch believes that the benefits and challenges related to operating decisions, as well as the effect of regional differences, macroeconomic factors and external restrictions on operations, are most commonly captured in operating costs.

Operating Cost Burden

Metric to Support Assessment
• Fitch measures a utility's ratio of total operating costs from a utility's financial statement relative to its million gallons (mg) of water produced and/or sewer flows treated during the year to determine operating cost burden. Generally, utility systems with an operating cost of $6,500/mg or less have an operating cost factor assessment of 'aa'; over $6,500/mg to $9,500/mg, 'a'; over $9,500/mg to $12,500/mg, 'bbb'; and over $12,500/mg, 'bb'.
• Stormwater utilities generally have limited operations and lack measured flows, and, thus, are assumed to have an operating cost factor assessment of 'aa' for stand-alone utilities unless there is evidence to suggest the assessment should be lower, in which case, the rationale for a lower assessment will be noted.

For the retail utilities that purchase water and/or sewer service from wholesale providers, these costs typically represent a material portion of operating expenses. Contract costs for purchasing utilities will typically encompass all costs borne directly by the provider, including purchased resources, if applicable, and capital costs.

Depreciation expense is highly reflective of asset ownership. While all retail utility systems own distribution or collection assets, higher levels of depreciation are typically associated with utilities that own treatment assets as well.

Other expenses include labor and administrative costs, and taxes or payments in lieu of taxes. Fitch typically includes amounts transferred out as an operating expense because the importance of these payments to the recipients significantly increases the likelihood that payments will be made, even during periods of financial stress. However, Fitch nets transfers out against incoming transfers as utilities may receive support from another fund on an ongoing basis (e.g. repayment of a loan from another fund, reimbursement of billing costs from another fund or support from a host municipality) and these moneys would be available for ongoing operations. Fitch may exclude transfers out in cases where the transfer represents payment of debt issued on behalf of the utility and Fitch has clear evidence as to the nature of the transfer. Labor costs, including pension-related costs, are generally a moderate portion of total utility expenses given the relatively low labor intensity of water and sewer service compared to other general government operations, but could become increasingly burdensome for utilities with large unfunded pension obligations.

The key metric Fitch uses to measure operating cost burden is the ratio of total annual operating costs to total million gallons of water produced and/or sewer flows treated on an average annual basis or, in the case of nontraditional utilities, the total average annual amount of water where there is an associated cost. Fitch typically assesses these metrics over the most recent five-year period. Specifically, Fitch assesses each utility's ratio against levels it considers to be representative of varying degrees of operating risk. Because stormwater utilities' primary activity revolves around managing the conveyance of intermittent flows (where measurement of flow amounts is largely unknown) and these utilities generally have much more limited operations than other water and sewer utilities, Fitch generally considers stand-alone stormwater utilities to have an operating cost assessment of 'aa', although the assessment could be constrained if average annual growth in operating expenses (typically over the most recent five-year period) significantly exceeds inflationary-type adjustments or unanticipated operating or regulatory risks develop.

Capital Planning and Management

Fitch believes producing and transmitting potable and non-potable water as well as collecting, treating and disposing of wastewater safely and reliably require significant and consistent capital investment. Ensuring the adequacy of resources to meet current and projected demand and the ability to deliver these essential services reliably are fundamental planning requirements of water and sewer utility systems and central to their missions. Expenditures necessary to add new resources and facilities or comply with environmental regulations often entail sizable and costly multiyear projects that can result in periodic spikes in expenditures. In contrast, the need for continual system investment, particularly to replace depreciating infrastructure, is necessary to maintain operating efficiency and preserve reliability.

Capital Planning and Management

Metrics to Support Assessment

- Fitch calculates a ratio to measure the status of a utility's life cycle based on information from a utility's financial statements and typically over the most recent five-year period. The life cycle ratio is calculated as age of plant as the numerator divided by the sum of age of plant plus remaining useful life. Age of plant is calculated as accumulated depreciation divided by annual depreciation expense, while remaining useful life is calculated as net capital assets divided by annual depreciation expense. In cases where accumulated depreciation is not available, Fitch will calculate age of plant as follows: 45 – (remaining useful life).
- Low life cycle ratio generally indicates low investment needs. Typically, a utility with a life cycle ratio of 45% or less is considered to have moderate investment needs and a capital assessment of 'aa'. Generally, a life cycle ratio greater than 45% indicates elevated investment needs. A high life cycle ratio (over 45%), combined with moderate average capital spending as a percentage of depreciation expense greater than or equal to 80%, has a capital assessment of 'a'; where capital spending is between 40% and 80% of depreciation, the assessment is 'bbb', while capital spending below 40% is assessed at 'bb'.

Fitch assesses capital planning and management for public water and sewer utilities through a review of the utility's historical spending practices and relative position within the facilities' life cycle. Fitch will also consider a utility's capital improvement plan (CIP) and projected spending requirements, when available. Where appropriate, Fitch may also review the CIP and projected spending of a utility's wholesale provider. The relative position of utilities within their life cycle is used to provide an indication of the condition of the physical operating plant, while the level of capital spending relative to depreciation helps to inform the sufficiency of infrastructure reinvestment.

Utilities whose cumulative depreciation relative to combined plant age and remaining useful life (i.e. life cycle ratio) is 45% or less are considered to have moderate investment needs, supporting a strong operating risk assessment. Utilities that are more than 45% through their life cycle may be susceptible to the effects of historical underinvestment in operating assets, which can include elevated levels of routine maintenance, weak production metrics and poor reliability. However, capital planning and management can be highly cyclical. Therefore, CIPs and recent spending aimed at addressing system deficiencies and increasing investment, as evidenced by capital spending near to, or well in excess of, annual depreciation, support a midrange assessment, despite the age of facilities. Conversely, older utilities that continue to underinvest, as evidenced by historical and projected capital spending that is significantly less than annual depreciation, are deemed to have high capital planning and management needs, and weak practices that are additive to operating risk.

Fitch's capital planning and management assessment may also include analysis of how planned projects fit with the utility's integrated resource plan and its long-term strategies, and the potential implications for operating risk. Operating risk could increase for utilities contemplating major construction projects specifically when plans exhibit weak planning mechanisms or involve complex or new technology judged to be higher risk. The project team's qualifications and experience could also be considerations. Guaranteed maximum price contracts, owners' and builders' contingencies, liquidated damages and capitalized interest funding are standard features utilized in most large utility construction projects, and serve to reduce the inherent construction and development risk in any large capital project. Where the

completion risk is considered material, it may constrain the overall operating risk assessment and will be considered in the scenario analysis described in the Financial Profile section.

If not included in the CIP, Fitch may request a multiyear capital budget — typically five years — to assess the effect planned or proposed capital investments will have on the financial profile of the utility system. The manner of intended funding, and the near- and longer-term effect on leverage, would be taken into account. A utility's expected funding sources can affect the credit rating outcome, depending on the degree of debt funding, versus cash on hand and cash from operations. Fitch reviews the timing, availability and assumptions regarding planned debt issuance and the effect on the borrower's balance sheet and cash flow. See the Financial Profile section.

Asymmetric Rating Factor Considerations – Operating Risk

The availability of adequate water supplies is critical for a utility to meet its customer demands. While supply or resource-management risk is considered low for most water utilities given the natural replenishment that typically occurs, a utility's operating risk assessment may be constrained where supplies may be insufficient to meet ongoing demands. Shortfalls in resource capacity are expected to be met through either wholesale purchases (where available) or construction of additional infrastructure to enable diversion of such resources. The emphasis of Fitch's operating risks assessment is therefore on cost and perceived difficulties in ensuring adequate supply resources.

Financial Profile

The third key rating driver is a utility's financial profile. Having evaluated a utility's revenue defensibility and operating risks, Fitch considers the entity's financial flexibility through a range of scenarios intended to assess its relative capacity to repay debt and other liabilities. This analysis will connect the utility's overall business risk profile, through its revenue defensibility and operating risks assessments, with its leverage and liquidity profile, assessed on a forward-looking and through-the-cycle basis, rather than a single point in time. The evolution of the financial profile, its low point and its average through-the-cycle performance, is considered. The assessment considers direct debt liabilities, pension liabilities and capitalized obligations, as described below.

Leverage Profile

Fitch will develop cash flow scenarios to frame the financial profile assessment. These scenarios will include a base case and a stress case. Revenue and operating cost assumptions, together with planned capex and additional debt capital or liability growth, are developed for the scenarios based on Fitch's review of a utility's historical performance and expectations for future performance.

Scenarios may be revised as appropriate to reflect changes in assumptions, as well as updated spending and debt plans. Fitch's expectations reflected in the scenario will further be shaped by revenue and operating risk key rating driver assessments. Peer analysis will be used wherever appropriate and if ratings for a relevant group of peers with similar operating and revenue defensibility profiles can be compiled. For conduit issuers, including issuers that benefit from contractual frameworks in which revenues and costs are largely balanced and passed through to other obligors, the leverage profile may be less of a consideration in the rating, and scenario analysis may be unnecessary.

Base Case Informs Scenario Analysis for Stress Case

Fitch will evaluate a base case cash flow scenario that serves as Fitch's expected performance in the current operating environment, typically over the next five years. The stress case will consist of a through-the-cycle scenario that incorporates a capital stress as described below. The stress case scenario analysis will reveal levels and shifts in key operating, leverage and liquidity metrics contrasted with the base case to determine if they are consistent with a stable rating through that stress.

Leverage Profile Key Focus of Stress Case Scenario

The stress case scenario highlights expected future financial leverage of the utility, considering both through-the-cycle elements and forward-looking expectations. The measure of financial

leverage considers the level of debt as it relates to the generation of cash flow. The relative strength of balance sheet and available resources to absorb changes in working capital is considered in the context of the ability to adjust revenue to recover expenses and manage operating risks when forming a rating view.

Net Adjusted Debt to Adjusted FADS

Future financial leverage in the stress case scenario is reflected in the net adjusted debt to adjusted FADS ratio, which measures a utility's debt and other fixed obligations (net of certain balance sheet resources), relative to its annual cash flows available to service those obligations.

Net Adjusted Debt to Adjusted FADS Ratio

$$\frac{\text{Total Debt + Capitalized Fixed Charges + Adjusted Net Pension Liability – Available Cash – Funds Restricted for Debt Service}}{\text{FADS + Fixed Services Expense + Operating Leases + Net Transfers + Pension Expense}}$$

- **Available Cash:** Cash and investments available for short-term liquidity needs with no limitations on use, including funds restricted solely by board or management policy and/or available for general utility purposes (e.g. rate stabilization fund, operating reserve, and renewal and replacement reserve). Funds that are explicitly limited for construction or other capital investment such as bond proceeds are not included.
- **Capitalized Fixed Charges:** (Fixed services expense + operating leases) * 7
  See Rationale for Capitalization of Fixed Charges on page 12 for more information.
- **FADS:** EBITDA plus interest income, taxes, other non-operating cash receipts not restricted as to spending and connection/availability fees. FADS may further reflect adjustments for noncash expenses, nonrecurring items and non-operating expenses paid ahead of debt service as appropriate. Lastly, FADS will be adjusted to exclude operating expenses where a gross lien is provided and the entity is not subject to bankruptcy or other insolvency proceedings while rated debt is outstanding.
- **Fixed Services Expense:** Purchased water and/or sewer services * 35% + operating leases.
  See Rationale for Capitalization of Fixed Charges on page 12 for more information.
- **Funds Restricted for Debt Service:** Includes amounts deposited in debt service and debt service reserve funds.
- **Net Transfers:** Sum of transfers in less transfers out.
  See Rationale for Transfer Treatment in Leverage Metrics on page 13 for more information.
- **Total Debt:** All long-term and short-term debt obligations including capital leases, outstanding commercial paper, notes payable and current maturities. Certain nonrecourse obligations and separately secured obligations may be excluded.
- **Pension Expense:** Equals the utility's reported annual pension expense.
  See Rationale for Pension Treatment in Leverage Metrics on page 13 for more information.
- **Adjusted Net Pension Liability:** Equals the utility's reported net pension liability adjusted upward to reflect Fitch's assumed 6% discount rate, if the plan uses a higher discount rate.
  See Rationale for Pension Treatment in Leverage Metrics on page 13 for more information.

EBITDA – Earnings before interest, taxes, depreciation and amortization. FADS – Funds available for debt service.

The resulting value is expressed as a multiple and may be positive or negative (where a utility holds more cash and investments than the amount of its outstanding debt or reports operating losses). High values, or negative values as a result of operating losses, imply lower flexibility in meeting and managing debt and long-term liability obligations, as well as a lower capacity for additional debt absent rate increases and improved cash flows (see *Rating Positioning* table on page 18). In calculating net adjusted debt to adjusted FADS, Fitch will employ an alternative calculation that excludes operating expenses where a statutory framework provides a gross lien on revenues of an entity not subject to bankruptcy or other insolvency proceedings while rated debt is outstanding.

Rationale for Capitalization of Fixed Charges

Fitch views fixed obligations related to purchased water and/or sewer services as a debt-equivalent form of funding for operational assets and adjusts its core leverage ratios to include the debt-like features of these agreements. Where purchased services agreements exist, Fitch will capitalize 35% of a utility's purchased service expenses using a 7.0x multiple to create a debt-equivalent figure. This figure represents the estimated funding level for a hypothetical purchase of the assets and is included in Fitch's core leverage metrics.

A multiple of 7.0x reflects assets with an average remaining economic life of 28 years, consistent with the long-dated infrastructure assets owned by water and sewer utilities, in a 6% interest rate

environment. This adjustment enables a broad comparison between rated entities that incur debt to finance supply and treatment assets and those that contract for services. In cases where a utility's actual fixed charges and related off-balance sheet debt are available, or prevailing agreements include no fixed charges, appropriate adjustments may be used in Fitch's analysis.

Certain operating leases that are long term in nature are also viewed as a debt-equivalent form of funding. New accounting standards will establish principles reporting the assets and liabilities that arise from certain leases. For entities that adopted these standards, Fitch will include the reported liabilities in its calculation of long-term debt and make further adjustments to income statement metrics for operating lease payments, if appropriate. Where these accounting standards have not been adopted, operating leases that function more like capital leases or debt will be capitalized in a similar manner and included in adjusted debt metrics.

Rationale for Pension Treatment in Leverage Metrics

Issuers with defined-benefit (DB) pensions carry a financial obligation that is long term in nature, and uncertain in timing and amounts to be paid. Fitch views unfunded pension liabilities, which broadly represent the accrued liabilities in excess of the invested assets available to meet the obligation, as a debt-equivalent obligation that may be included in the calculation of Fitch's core leverage metrics and its assessment of an issuer's financial profile. Fitch's determination of each issuer's exposure to and level of pension obligations is dependent upon a number of variables, including accounting standards, applicable regulations and funding practices. The methodologies and parameters used in Fitch's analysis are outlined in *Appendix D: Pension Treatment in Leverage Metrics*.

Other Post-Employment Benefits: In most cases, Fitch does not consider the credit impact of other post-employment benefits (OPEB) in assessing the long-term liabilities of water and sewer utilities. For most governmental entities providing OPEB, the level of benefits has proven much easier to change than pensions, and legal protections appear limited in most cases. In cases where OPEB is exceptionally large and not subject to modification, Fitch may incorporate OPEB as an asymmetric risk factor.

Rationale for Transfer Treatment in Leverage Metrics

Fitch includes net transfers in its calculation of adjusted FADS in its leverage assessments. Amounts regularly transferred or paid to owners, a host municipality or other funds are subtracted and treated as an operating expense in its calculation of adjusted FADS. These transfer payments may be reported as non-operating expenses or explicitly subordinate to debt service payments. However, Fitch believes the importance of these payments to the recipients in most cases significantly increases the likelihood payments will be made, even during periods of financial stress, and particularly during periods of financial stress affecting the host municipality. Moreover, given the timing of remittance, payments are often made prior to debt service. Fitch may exclude transfers out if such transfers reflect payment for debt issued by the host government or other fund on behalf of the utility if Fitch has clear evidence as to the nature of the transfers. Alternatively, amounts regularly paid to the utility by the host municipality or affiliated funds may be netted against operating expenses as these types of payments are typically repayments for interfund loans made by the water and/or sewer utility or defined arrangements for particular services or commitments.

Establishing the Base Case

The development of a base case begins with Fitch's evaluation of a utility's recent historical performance based on a review of its audited financial statements and any unaudited financial information — typically interim statements — covering a period of at least three years. The most recent unaudited financials will usually inform year one of the base case scenario. If Fitch is provided with three quarters of year-to-date information, it may add those results as a final year preceding the base case scenario.

The base case reflects Fitch's expectation of both historical financial results and projected performance. Fitch will consider the level of consistency in the recent financial and operating

performance of the utility, its management team and its market as one indicator of future performance. Fitch will generally start the base case analysis using assumptions, reflecting variability in revenue and expense performance derived from long-term historical performance. However, there may be analytical reasons to diverge from these assumptions (e.g. nonrecurring events). Fitch will evaluate each utility, and develop and communicate expectations.

Although Fitch will review a utility's annual operating budget or longer-term forecast when presented, the Fitch base case ultimately reflects its criteria and expectations, including macroeconomic assumptions. Fitch will consider the reasonableness of the assumptions that drive projected results if the utility's forecast suggests future performance is expected to track differently from historical results due to items such as significant capital expenditures, changes in rate design or incorporated stresses. Forecasts that rely on aggressive volume growth, non-core revenue, rate increases that are materially different than historical changes or cost reductions will be viewed with analytical caution in the rating process. Conversely, Fitch's base case may rely more on historical trends where utility forecasts reflect stresses applied for planning purposes.

Stress Case Reflected in Forward-Looking Scenarios

The stress case analysis considers potential performance under a common set of assumptions, thereby illustrating how cycles affect individual utilities differently. Ultimately, the stress case reflects a stress through which the rating is expected to remain stable.

The Fitch Analytical Stress Test (FAST) is used to formulate the base case and a stress case. The tool in essence highlights how a utility's financial profile can change through a business cycle and capital stress. While FAST supports Fitch's through-the-cycle analysis, it is not a forecasting tool. FAST should be considered a scenario tool to be used in the rating process to better differentiate between credits.

Fitch's overarching philosophy is that ratings should not change due to normal cyclical variations. Economic downturns are inevitable, and variations in financial performance in many cases can be observed. Fitch believes ratings should account for this. However, broad shifts different from the ebb and flow of a normal business and capital cycle may also occur. Scenario analysis helps make the distinction between the two and helps communicate both rating sensitivities and what is already anticipated in the current rating. See Appendix A for additional detail on the FAST tool.

The typical stress assumed in the stress case scenario for IDRs of 'BB' category and above will generally reflect revenue and cost stresses commensurate with those a utility would encounter following an unexpected increase in capital costs based on its specific characteristics and risk attributes. The purpose of the scenario analysis is to establish benchmark measures of liquidity and leverage that are incorporated in the rating through the cycle. The stress case will reflect a capital cost stress using the assumptions outlined in Appendix A.

The effect of the unforeseen capital expenses on leverage will be reflected in the scenario, as will Fitch's expectations of the utility's response. The FAST tool applied to the utility systems and discussed further below will be the source for evaluating the change of leverage and prospects for a utility managing through such capital stress while maintaining its financial profile.

Liquidity Profile

In addition to the leverage metric analysis described above, Fitch also performs a liquidity assessment. The liquidity profile assessment evaluates the liquidity resources available to a utility to meet expected and unexpected current business obligations relating to both operating and debt expenses. The first resource available to most utilities is periodic excess margin above operating costs that acts as a cushion to changing circumstance. A second source is available cash and investments in reserve, and a third, albeit for relatively few water and sewer utilities, is committed liquidity lines from investment-grade financial institutions.

A weak liquidity profile relative to operations can constrain the overall assessment of the utility's financial profile. Two key metrics used by Fitch to measure liquidity are coverage of full obligations (COFO) and liquidity cushion.

Coverage of Full Obligations

COFO is a measure of operational strength relative to a utility's debt and fixed obligations that come due in any annual period. While Fitch calculates a traditional debt service coverage (DSC) ratio for all public utility issuers, the calculation of COFO facilitates comparability among utilities as it also considers the effect of fixed services expense, as well as net transfers, on a utility's liquidity profile. Fitch takes into consideration growth-sensitive revenues, such as connection/availability fees in the calculation of both COFO and DSC. However, given the potential variability of such revenues, utilities generating COFO or DSC below 1.0x excluding such sources are considered to have a 'weak' liquidity profile. A comparison of coverage calculations is provided in the Coverage Ratio Calculations — Example table below to illustrate the effect on coverage of a utility's obligations when purchased water/sewer services are capitalized and net transfers are accounted for.

Coverage of Full Obligations Ratio

$$\frac{\text{FADS + Fixed Services Expense + Net Transfers}}{\text{Total Annual Debt Service + Fixed Services Expense}}$$

- FADS: EBITDA plus interest income, taxes, other non-operating cash receipts not restricted as to spending and connection/availability fees. FADS may further reflect adjustments for noncash expenses, nonrecurring items and non-operating expenses paid ahead of debt service as appropriate. FADS for purposes of COFO will include operating expenses for all entities, including those where a gross lien is provided and the entity is not subject to bankruptcy or other insolvency proceedings while rated debt is outstanding.
- Fixed Services Expense: Purchased water and/or sewer services * 35%.
  See Rationale for Capitalization of Fixed Charges on page 12 for more information.
- Net Transfers: Sum of transfers in less transfers out.
  See Rationale for Transfer Treatment in Leverage Metrics on page 13 for more information.
- Total Annual Debt Service: Interest expense plus scheduled long-term principal payments (i.e. prior year's current portion of long-term debt). Voluntary prepayments and principal amounts repaid as part of a refinancing are not included. However, where principal incorporates balloon indebtedness, long-term bank facilities, remarketed debt or bullet maturities, Fitch may adjust scheduled debt service to eliminate amounts successfully refinanced, remarketed or renewed, or to include payments on debt obligations reported as operating expenses. Interest expense may also be adjusted for capitalized interest.

EBITDA – Earnings before interest, tax, depreciation and amortization. FADS – Funds available for debt service.

COFO is used to assess an entity's liquidity profile as follows:

Coverage of Full Obligations (COFO)

Metrics to Support Assessment

- COFO generally less than 1.0x from all available revenues and/or generally less than 1.0x excluding connection/availability fees is weak and risk additive.
- COFO below 1.0x may not be considered risk additive if a borrower maintains Current Days Cash on Hand at 120 days or more.

- **Current Cash Available:** Current unrestricted cash/investments and current restricted cash/investments that are restricted solely by board or management policy and/or available for general utility purposes (e.g. rate stabilization fund, operating reserve and renewal and replacement reserve).
- **Current Days Cash on Hand:** (Current Cash Available / [operating expenses – depreciation and amortization]) * 365.

Coverage Ratio Calculations — Example

($)	DSC Calculation	Coverage of Full Obligations Calculation
Operating Revenue	1,000	1,000
Purchased Water/Sewer Services	(300)	(300)
Other Operating Expenses (Excluding Depreciation and Amortization)	(500)	(500)

Coverage Ratio Calculations — Example

($)	DSC Calculation	Coverage of Full Obligations Calculation
EBITDA	200	200
Interest Income	10	10
Taxes	50	50
Other Available Revenues	5	5
Connection/Availability Fees	40	40
FADS	305	305
Fixed Services Expense	—	105
Net Transfers	—	(50)
Adjusted FADS	305	360
Adjusted FADS without Connection/Availability Fees	265	320
Cash Interest Paid	25	25
Scheduled Principal Payments	25	25
Debt Service	50	50
Fixed Charges (Adjusted for Purchased Water and/or Sewer Services)	—	105
Adjusted Debt Service	50	155
Debt Service Coverage (x)	6.1	—
Debt Service Coverage without Connection/Availability Fees (x)	5.3	
Coverage of Full Obligations (x)	—	2.3
Coverage of Full Obligations without Connection/Availability Fees (x)		2.1

Liquidity Cushion

Liquidity cushion measures a utility's liquidity — current and available cash and investments, and available lines of credit — against average daily cash operating expenses (excluding depreciation and amortization). In addition to assessing a utility's full liquidity cushion, Fitch also assesses the individual components against average daily cash operating expenses, if applicable. Both of the ratios measure the number of days the utility could continue to pay its average daily cash operating expenses using relevant sources of liquidity.

Liquidity Cushion Ratio

$$\frac{\text{Current Cash Available + Available Borrowing Capacity}}{\text{Average Daily Cash Operating Expenses}}$$

- **Available Borrowing Capacity:** Amounts remaining and available from lines of credit.
- **Average Daily Cash Operating Expenses:** (Operating expenses – depreciation and amortization) / 365.
- **Current Cash Available:** Current unrestricted cash/investments and current restricted cash/investments that are restricted solely by board or management policy and/or available for general utility purposes (e.g. rate stabilization fund, operating reserve, and renewal and replacement reserve).

Available borrowing capacity under committed lines of credit is included in the liquidity cushion ratio if provided by investment-grade financial institutions, or lower-rated institutions if the rating is equivalent to the utility rating. Where necessary information is not available, liquidity will be assessed without explicit credit for borrowing capacity. Similarly, borrowing capacity includes available issuance capacity under commercial paper (CP) programs where the allowable use of proceeds includes payment of scheduled debt service or is unrestricted. Programs rated 'F3' by Fitch will not be included when calculating borrowing capacity. Programs where the use of

proceeds is limited to capital investment may also be excluded when calculating borrowing capacity.

Liquidity Cushion

Metric to Support Assessment
• A liquidity cushion at or above 90 days is neutral to ratings, as long as Current Cash Available is at or above 30 days. A liquidity cushion below 90 days or Current Cash Available below 30 days are considered weak and risk additive.

The liquidity cushion assessment for utility systems organized as enterprise funds may include a separate review of the host municipality when government-wide cash balances are consolidated and held within the general fund. Fitch's review will include an evaluation of the sufficiency of cash on hand, and the utility's access and availability to funds. Government-wide cash on hand is considered neutral; below 60 days is considered weak and is risk additive.

Rating Guidance: Applying Analytical Judgment to Align Key Risk Factors and Ratings

The results of the stress case scenario are used to assess the impact of change on key liquidity and leverage metrics. Together, these create a financial profile on a forward-looking and through-the-cycle basis aligned with the assessment of key rating drivers to obtain an indicative rating level. The *Rating Positioning* table below provides guidance to the analytical outcome, aligning the assessment of the utility's overall business risk profile — through revenue defensibility and operating risks assessments — with its leverage and liquidity profile.

The evaluation and importance of key rating drivers are specific to the individual credit being considered. However, while both revenue defensibility and operating risks are important in evaluating a utility's financial profile, in some cases, revenue defensibility can have a greater influence in the determination of a utility's financial profile, as illustrated below. For example, utilities with a revenue defensibility assessment of 'aa' and Operating Risks assessment of 'bbb' can operate at a higher degree of financial leverage than utilities with a revenue defensibility assessment of 'bbb' and operating risks assessment of 'aa' and achieve the same financial profile assessment.

The *Rating Positioning* table is the starting point in assessing the final rating. For example, ratings may be higher or lower than suggested by the table based on an analytical judgment made concerning whether there are factors present that suggest a higher or lower risk of a shift in capacity for meeting financial obligations than would be suggested by the rating derived from the table. Factors supporting a higher rating could include a utility's capex profile and its position within the capital life cycle; rate designs that collect a higher percentage of revenue through fixed service charges or recovery mechanisms that significantly buffer the effect of demand variability; and tax pledges and/or revenues that have or could have the potential to provide meaningful enhancement to revenues or particular characteristics that limit exposure to operating risks.

Rating Positioning

Revenue Defensibility Assessment	Operating Risks Assessment	Financial Profile Assessment - Leverage Profile (Net Adjusted Debt/Adjusted FADS) (x)				
		aaa	aa	a	bbb	bb
aa	aa	<5	5–10	10–14	14–16	>16
aa	a	<4	4–8	8–12	12–16	>16
a	aa	<4	4–8	8–12	12–16	>16
aa	bbb	—	<7	7–11	11–14	>14
a	a	—	<6	6–11	11–14	>14
a	bbb	—	<6	6–11	11–14	>14
aa	bb	—	<5	5–9	9–12	>12
a	bb	—	<4	4–7	7–12	>12
bbb	aa	—	<4	4–7	7–12	>12
bbb	a	—	<4	4–7	7–12	>12
bbb	bbb	—	<0	0–5	5–6	>6
bbb	bb	—	<0	0–1	1–4	>4
bb	aa	—	—	<1	1–4	>4
bb	a	—	—	<0	0–4	>4
bb	bbb	—	—	<0	0–2	>2
bb	bb	—	—	<(3)	(3)–0	>0
Suggested Analytical Outcome		**AAA**	**AA**	**A**	**BBB**	**BB**

FADS – Funds available for debt service.

The *Rating Positioning* table is constructed assuming all asymmetric risk-additive features are neutral and the utility does not have a weak liquidity profile. Ratings may be notched lower from the guidance if negative asymmetric factors are present or the utility has a weak liquidity profile. The degree of notching is qualitatively assessed and reflects a judgment on the relative additional risks to financial capacity that may result. Multiple asymmetric risk factors are likely to result in multiple notches. A single factor may not result in any notching if its effect on financial capacity is considered limited, or is already reflected in a rating sensitivity or a Negative Outlook.

Other Considerations

Counterparty Focus

Leverage profile may be less of a consideration in a rating where the utility benefits from a contractual framework in which revenues and costs are largely balanced through pass throughs to one or more counterparties. In such cases, protections afforded in the contractual framework to mitigate the loss of one or more counterparties will be more relevant to the final rating outcome. Where a utility is exposed to a single counterparty or to the loss of the weakest among a group of counterparties, the rating will generally be no higher than the rating of the single or the weakest counterparty unless there are mitigating structural features that allow absorption of that loss without materially altering a utility's financial profile.

Volatility in Financial Profile

Higher than normal volatility in the leverage profile of a utility historically or in a through-the-cycle scenario may suggest a rating lower than that indicated by the *Rating Positioning* table.

No Funded Debt

For utilities with financial obligations, but no funded debt, the leverage profile may be less of a consideration in a rating. In these cases, a utility's revenue defensibility or operating risks assessment may be more relevant in determining the final rating outcome.

Asymmetric Additive Risk Considerations

The final rating assigned will also consider certain additional risk factors that may affect the rating conclusion. These additional risk factors work asymmetrically, where only below-standard features are factored into the final rating levels, while more credit-positive features are expected to be the rule and are considered credit neutral.

When multiple risk-additive features exist, the rating will be lower than the indicative rating, possibly by multiple notches, based on the severity of the risks. For example, a utility with a midrange revenue defensibility assessment, and operating risks assessment and net leverage consistent with an indicative rating of 'AA' might only achieve a rating of 'A+' if its debt structure was assessed to be weak, reflecting a material exposure to refinance risk or swap risk. It might only achieve a rating of 'A' if debt structure, and management and governance practices were assessed as weak. The final rating will reflect a qualitative assessment of the extent and impact of the asymmetric risk factors. The asymmetric considerations are discussed fully in Fitch's master criteria "Public-Sector, Revenue-Supported Entities Rating Criteria."

Debt Structure and Contingent Liability Exposures

Public water and sewer utility debt structures are typically strong, characterized by long-dated (20–40 years) amortizing debt issues with fixed or declining annual debt service requirements. While some utilities utilize bullet structures, variable-rate demand bonds (both hedged and unhedged), direct placement and renewable bank financing, the par value of these financing vehicles is usually manageable or below the level of cash on hand, thereby eliminating significant interest rate and refinancing risk. Thus, the debt structure attribute for many utility systems is neutral. However, there may be utilities whose debt structures have features that add risk, such as non-amortizing bullet maturities or mandatory put bonds. These will be considered when assessing adjustments to the rating suggested by the *Rating Positioning* table.

While most variable-rate demand bonds and CP issuance are supported by external dedicated liquidity facilities provided by financial institutions, borrowers sometimes choose to support these obligations using their own internal liquidity, including unrestricted cash and investments, and general lines of credit. In such instances, Fitch's analysis considers the stability and availability of funds sufficient to meet potential purchase requirements, as well as the policies and procedures that would be followed if a failed remarketing occurs (see "Public-Sector, Revenue-Supported Entities Rating Criteria"). Moreover, Fitch may evaluate the potential change in leverage that could result from utilization of cash resources in the financial profile assessment.

A weak debt structure will constrain the overall assessment of the utility's financial profile. Absent unrestricted cash resources sufficient to address structural shortcomings, Fitch considers the following debt characteristics and terms consistent with a weak assessment:

- Material exposure to refinance risk (use of bullet maturities; debt not fully amortized at maturity), which distorts near-term financial metrics and increases the uncertainty of both market access and the cost of debt at a future date.
- Highly sculpted and substantial use of deferred amortization instruments that materially distort near-term financial metrics.
- Material exposure to unhedged floating-rate interest. Fitch considers whether the unhedged portion of exposure, if any, would have a material impact to the utility's financial profile under stressed interest rate assumptions.

- Material exposure to contingent liabilities, including swap and derivative contracts that include collateral posting requirements, and termination events that require a payment of the current marked-to-market value of the swap contract.

For more information on Fitch's global approach to analyzing debt structures, see Fitch's master criteria "Public-Sector, Revenue-Supported Entities Rating Criteria."

Management and Governance

The quality of management and governance is an important consideration when assessing the potential performance of a utility over the life of its debt. However, Fitch considers this attribute to be asymmetric, where weak management and governance may cause the rating to be lower, all else being equal. In contrast, the presence of strong management and governance — as evidenced by comprehensive strategic planning and adherence to financial policies, particularly rate setting — will be considered when evaluating the impact of stress scenarios and the ability of a utility to manage through those stresses.

Weaker characteristics of management and governance that may constrain the rating, when analyzing the ability to execute on organization initiatives and plans, as well as the capacity to manage through the business cycle include:

- Lack of experience and depth at the utility.
- Significant political pressure in the underlying municipality or in the members' service areas that can delay or prevent rate increases and impair its financial profile.
- Political considerations that impose a disproportionate influence or a limitation on utility operations and decision making.
- Repeated failure to adopt budgets in a timely manner due to absence of consensus in governing body or resistance of key stakeholders.
- Failure to maintain open communications between the utility and any relevant governing body, which may reveal itself in unexpected operating changes.
- Weak or lack of forecasts and resource-management plans.
- Limited or lack of policies and procedures.
- Official allegations of substantial corruption, or breach of financial reporting law or regulation.

Legal and Regulatory

Forming an opinion of the quality of the legal or contractual framework upon which many assumptions rest is a prerequisite to the credit analysis. For instance, the framework may be purely contractual or rely on statute or codified law, or a particular statutory instrument, or the powers of a constitutional or statutory authority. Fitch forms a view on the clarity of the legislation and/or regulation, the scope of regulatory discretion, and any effect this may have on facility performance or dispute resolution. The financing documentation — and if appropriate, any legislation it may depend on — or detailed summary documents, such as offering materials, are reviewed for key commercial elements and contract clarity, especially regarding allocation or transfer of risk.

The water and sewer sector is exposed to a wide range of state and federal regulation. A utility's effective participation in the regulatory and legislative processes and its response to regulatory developments are therefore considered in Fitch's analysis. Fitch combines a review of the current and expected regulatory climate with an assessment of the organization's ability to maintain stable operations in the face of regulatory change. Fitch may review responses to prior regulatory mandates, identifying financial and operational effects. Fitch also examines the potential for future regulatory initiatives and assesses whether the organization, through its systems, practices and resources, will have the ability to manage potential downside risk.

Weaker characteristics of legal and regulatory framework include:

- Contractual, regulatory or statutory framework dependent on untested or temporary legislation or regulation.
- Weak or no legal opinions; contracts not available for inspection.
- Proposed legislation or initiatives that would curtail existing rate-setting authority.
- Less effective participation in regulatory process with negative regulatory outcomes.

Information Quality

The quality of information received by Fitch, both quantitative and qualitative, can be a constraining factor for ratings. Information quality may constrain the rating category to a maximum level or, in extreme cases, preclude the assignment of a rating. Information quality for the initial rating and for surveillance purposes is considered when a rating is first assigned. Fitch must be confident adequate ongoing data will be available to monitor and maintain a rating once assigned. Information quality encompasses such factors as timeliness and frequency, reliability, level of detail and scope.

The information provided to Fitch may contain reports, forecasts or opinions provided to the utility or their agents by various experts. Where these reports contain matters of fact, Fitch will consider the source and reliability. Where the information is a forecast or opinion, Fitch expects these to be based on well-reasoned analysis supported by the facts.

The status of the expert and the materiality of their forecast or opinion will also be considered in determining what weight may be given their forecasts or opinions. Factors such as experience in the jurisdiction, location or terrain; experience with the technology or transaction type; and formal qualification or licensing are often relevant. When forming its rating opinion, Fitch may place less weight on expert reports that lack clarity or contain extensive caveats, or were conducted under less relevant circumstances. Such features may lead to adjustments in Fitch's financial or operational analysis. Fitch expects experts to conduct their reports to professional standards. If possible, reports are compared with similar reports to highlight unusual or optimistic features.

The degree to which Fitch uses expert information will depend partly on the above issues and on the relevance of the information to the identified key risks. Where available, if expert information does not address a material issue, but might be expected to, Fitch may request further information or make an appropriate assumption. Fitch may choose not to provide a rating if it determines the reports are not sufficiently supported, complete or reliable.

Fitch considers this attribute to be negative when information is substantially based on assumptions, extrapolated or subject to material caveats; if the data are often subject to delay, has a history of revisions or errors, or is limited in scope.

Data Sources

The key rating assumptions for the criteria are informed by Fitch's analysis of information provided by obligors, financial advisors, legal advisors, third-party engineers, consultants, underwriters and/or available through public sources. Information includes, but is not limited to, audited and interim financial statements, regulatory filings, operational data and service area demographic information. In certain cases where data specific to particular factors in these criteria are unavailable, Fitch may use other data sources to extrapolate information or may assign a particular credit factor an assessment level Fitch feels is appropriate.

Fitch typically uses both consolidated audited financial statements and segment financial information in its credit analysis. However, there are instances where Fitch is asked to rate a newly formed entity or segment that cannot provide historical audited financial results. In those cases, Fitch may base its analysis on historical pro forma financial statements provided by the entity. Fitch will evaluate the legal, financial, operational and managerial linkage between obligors and affiliated segments. The credit

analysis and rating rationale will be based on fully consolidated statements where Fitch deems the dependence or inter-reliance among segments to be significant.

Rating Assumptions Sensitivities

Revenue Defensibility: Ratings are sensitive to changes in attributes of revenue defensibility that affect overall assessment. Changes in service area characteristics, rate flexibility or counterparty quality (if applicable) can change the final assessment.

Operating Risks: Ratings are sensitive to changes in operating risks attributes, reflecting shifts in operating costs, operating cost flexibility and capital needs.

Financial Profile: Ratings are sensitive to changes in leverage profile or liquidity profile that result in a different analytical outcome than suggested in the *Rating Positioning* table.

Variations from Criteria

Fitch's criteria are designed to be used in conjunction with experienced analytical judgment exercised through a committee process. The combination of transparent criteria, analytical judgment applied on a transaction-by-transaction or issuer-by-issuer basis, and full disclosure via rating commentary strengthens Fitch's rating process while assisting market participants in understanding the analysis behind our ratings.

A rating committee may adjust the application of these criteria to reflect the risks of a specific transaction or entity. Such adjustments are called variations. All variations will be disclosed in the respective rating action commentaries, including their impact on the rating where appropriate.

A variation can be approved by a ratings committee where the risk, feature or other factor relevant to the assignment of a rating and the methodology applied to it are both included within the scope of the criteria, but where the analysis described in the criteria requires modification to address factors specific to the particular transaction or entity.

Limitations

Ratings, including Rating Watches and Outlooks, assigned by Fitch are subject to the limitations specified in Fitch's Ratings Definitions and available at www.fitchratings.com/site/definitions.

Disclosure

Fitch expects to disclose, as part of its rating action commentaries or new issue reports, base case and stress case assumptions, and the rationale for adjustments to either the base case or stress case assumptions. Fitch will also disclose each entity's functional responsibilities to the extent they serve as the foundation of the assessment, and any direct relationship between the general government's credit quality and related utility securities within the appropriate rating action commentary. In addition, Fitch will disclose any variation to criteria (as mentioned in the *Variations from Criteria* section).

Appendix A: FAST Water & Sewer – Fitch Analytical Stress Test

Fitch's FAST for U.S. water and sewer utilities highlights the forward-looking performance of a utility, typically over a five-year period, although it is not intended to be a cash flow or operating forecast. FAST assesses the impact of an unanticipated increase in capital spending on operating cash flows and net leverage. Unanticipated increases in capital spending can occur as a result of numerous situations, including sequencing of project timing, change of scope or rising labor and commodity costs, as well as unplanned projects arising from regulatory requirements or operating challenges. Given the potential impact these increases can have on financial leverage and liquidity, Fitch believes such changes within reasonably anticipated ranges should be accounted for in its rating.

Scenario Analysis

The starting point for FAST's scenario analysis is a base case that generally follows the last five years (minimum of three) of financial reporting to illustrate a business-as-usual baseline performance scenario. The base case typically relies on standard default assumptions as outlined below. However, in some cases, if deemed reasonable by Fitch, the base case may incorporate projections from the utility. FAST's stress case assumes a uniform capital spending stress specified as a 10% increase over the assumed base case level that is financed by debt. For each case, the scenario analysis will calculate basic financial metrics, including net adjusted debt to adjusted FADS, COFO and DSC.

FAST Default Assumptions

Assumption	Applies to:
Grown at rate of inflation (2%)	• Non-operating revenues from taxes, investment income, net transfers and subsidies • Restricted cash and investments (excluding construction funds)
Fixed at most recent historical (typically five-year) average	• Non-operating revenues from miscellaneous cash • Connection fees • Purchased water/sewer services • Capital expenditures (150% of average)
Grown at rate of three- or five-year CAGR	• Operating expenses (excluding depreciation and purchased water/sewer services) • Operating revenues (capped at operating expense growth CAGR)
Held constant in nominal terms	• Operating lease expense • Restricted construction funds (unspent balances held constant) • Adjusted net pension liability • Pension expense
Average interest rate implied by the last five or three years of historical data	• Principal payments (amortization based on the 15th year of a 30-year time horizon, at this interest rate) • Cash interest paid (total debt multiplied by this interest rate)

Appendix B: Wholesale Water/Sewer Utilities Key Rating Drivers

Fitch's three key rating drivers are assessed using the following guidance for wholesale public water and sewer utilities, including joint action agencies and other government-owned utilities. The guidance outlines general expectations for a given rating category, and in some cases, includes operational and financial assessments of both the wholesale provider and its purchasing entities.

Key Rating Drivers — Wholesale Water/Sewer Utilities

		aa	a	bbb	bb
Revenue Defensibility					
Revenue Source Characteristics		Wholesale revenues are derived from unconditional contracts that provide for full cost recovery, as well as the unlimited reallocation of costs among contracted purchasers.	Wholesale revenues are derived from unconditional contracts that provide for full cost recovery, but include limited reallocation of costs among contracted purchasers.	Wholesale revenues are derived from contracts that may include some degree of conditionality, no reallocation of costs among contracted purchasers or a sole purchaser.	Not applicable.
Rate Flexibility		Independent legal ability to increase service rates without external approval.	Legal ability to increase service rates is subject to approval of external authorities. History and expectation of operating and capital costs being recovered on a timely basis is strong.	Legal ability to increase service rates is subject to approval of external authorities. History and expectation that operating and capital costs may not be recovered on a full or timely basis.	Legal ability to increase service rates is subject to approval of external authorities. History and expectation that operating and capital cost recovery will be neither full nor timely.
Purchaser Credit Quality (PCQ)	Revenue Source Characteristics – 'aa'	Very strong purchaser credit quality. PCI is less than 1.5.	Strong purchaser credit quality. PCI equals 1.5 to 2.4.	Midrange purchaser credit quality. PCI equals 2.5 to 3.4.	Weak purchaser credit quality. PCI is over 3.4.
	Revenue Source Characteristics – 'a' or 'bbb'	Credit quality of weakest obligor(s) after mitigating structural features.			
Asymmetric Rating Driver Considerations	Reasonable replacement of service by purchasers with conditional contracts or a large percentage of revenues derived from non-monopoly operations are negative considerations.				
Operating Risks					
Operating Cost Burden		Very low operating cost burden equal to $6,500/mg or less.	Low operating cost burden equal to $6,500/mg to $9,500/mg.	Midrange operating cost burden equal to $9,500/mg to $12,500/mg.	High operating cost burden that exceeds over $12,500/mg.
	(Other Considerations)	Partial requirement or single-asset providers may be assessed based on the magnitude of costs and/or capacity as a percentage of the purchasers' total resources and related costs.			
Capital Planning and Management		Moderate life cycle investment needs supported by adequate capital investment. Life cycle ratio equals 45% or less.	Elevated life cycle investment needs but supported by adequate capital investment. Life cycle ratio equals 45% or greater and capital spending averages 80% or more.	Elevated life cycle investment needs with weak capital investment. Life cycle ratio equals 45% or greater and capital spending averages 40% to 80%.	Elevated High life cycle investment needs with extremely weak capital investment. Life cycle ratio equals 45% or greater and capital spending averages 40% or less.
Asymmetric Rating Driver Considerations	Meaningful supply or resource-management concerns, project completion risk and counterparty risk are negative considerations.				

Key Rating Drivers — Wholesale Water/Sewer Utilities

		aa	a	bbb	bb
Financial Profile					
Leverage Profile	(Net Adjusted Debt to Adjusted FADS)	Refer to the *Rating Positioning* table			
	(Other Considerations)	Leverage capacity may be increased depending on capital expenditures relative to position in capital life cycle; rate recovery mechanisms that limit revenue volatility; or revenue sources or structures capable of meaningfully enhancing existing revenues or limiting operating risk exposures.			
Liquidity Profile	(COFO Ratio)	Generally less than 1.0x from available revenues and/or revenues excluding connection fees is a constraining factor but may be mitigated with around 120 days or more of current cash available.			
	(Liquidity Cushion Ratio)	Generally less than 90 days total or less than 30 days current cash available is a constraining factor.			
Asymmetric Additional Risk Considerations	Debt structure and contingent liability, management and governance, legal and regulatory, information quality and rating relationship to the host government characteristics that are significantly outside the norm for the sector are factored into the final rating.				

COFO – Coverage of full obligations. FADS – Funds available for debt service. mg – Million gallons. PCI – Purchaser credit index.

Revenue Defensibility

The assessment of revenue defensibility for wholesale water and sewer providers includes a review of the applicable contractual framework pursuant to which water and/or sewer services are provided, the related obligations of all parties involved, purchaser credit quality (PCQ) and the provider's legal ability to determine rates.

Revenue Source Characteristics

Fitch reviews the contractual framework supporting a wholesale provider focusing specifically on the terms, tenor and conditionality of the payment obligations to assess the defensibility of revenue. Wholesale water and sewer providers generally exhibit very strong revenue defensibility, as revenue is typically derived from retail utilities pursuant to long-term and/or perpetually effective unconditional service contracts (see *Water and Sewer Service Contract Characteristics* table) that extend through the life of outstanding debt, and that provide for full cost recovery. In addition, there typically are practical limitations of retailers replacing the service provided by the wholesaler.

Moreover, a common feature of water and sewer service contracts throughout the sector allows wholesale providers to recover the obligations of a defaulting purchaser by increasing — or stepping up — the obligations of the remaining to non-defaulting purchasers. Fitch factors the ability, timeliness and degree to which a wholesaler can reallocate defaulted obligations among purchasers in its assessment of revenue defensibility.

Wholesale providers that rely exclusively on sales (whether they be contracted or uncontracted) that are subject to meaningful operating risk, termination or are otherwise highly conditional for the repayment of debt may not be rated using these criteria. These may include providers subject to completion risk, fully or significantly exposed to volume risk, or those providing services pursuant to contracts that may be terminated at the purchaser's option and where the purchaser has the practical ability to replace the service being provided to the extent that it poses significant business risk to the wholesaler. In these cases, Fitch's "Rating Criteria for Infrastructure and Project Finance" may be applied instead.

Rate Flexibility

Fitch's analysis of rate flexibility for wholesale providers focuses primarily on the provider's independent legal ability to determine rates of service. While a provider's rate competiveness is evaluated and may be particularly relevant for wholesalers facing contract renewals or seeking to expand membership, the influence of the wholesale cost of water and/or sewer service on rate

competitiveness and affordability is best measured at the retail level. Pressure to moderate or avoid wholesale rate increases is most likely to mount as a result of corresponding retail increases, and is considered a component of Fitch's analysis of PCQ.

Purchaser Credit Quality (PCQ)

The final component of the revenue defensibility assessment for wholesale providers is PCQ. An overwhelming majority of purchasers are expected to be municipally owned retail utilities exhibiting strong operating fundamentals. PCQ is therefore expected to be strong to very strong for most wholesale providers.

Fitch uses a variety of inputs to evaluate PCQ, including both private and public ratings, and internal credit opinions and credit scores. If Fitch does not maintain a rating, credit opinion or credit score on a purchaser, one may be assigned as required. In the event a wholesaler has a concentration of non-municipal purchasers and evaluation of such purchaser(s) would be performed per the parameters below, Fitch may assume such purchaser(s) to have weak credit quality, or credit quality generally consistent with no higher than a 'B' rating.

Fitch's framework for credit scoring retail municipal utilities incorporates many of the same factors previously outlined. However, a credit score is subject to different standards than a full rating or credit opinion. Credit scores assess a limited range of factors and are point-in-time. Specifically, the credit score considers a utility's ability to absorb rate increases, measured by its rate flexibility and service area characteristics as a proxy for revenue defensibility, and net margin and cash cushion ratio as a proxy for financial profile. Operating risks is not considered for credit scoring.

Revenue Source Characteristics — 'aa'

For providers with a revenue source characteristic assessment of 'aa', Fitch will use individual purchaser evaluations to calculate a purchaser credit index (PCI), which numerically reflects the weighted average credit quality of the relevant obligors. Fitch will evaluate purchasers that in aggregate account for at least 40% of the provider's total wholesale revenue or sales when calculating the PCI and determining the PCQ assessment.

Purchaser Credit Index (PCI)

Metric to Support Assessment
• Wholesale utilities whose purchasers have a PCI of less than 1.5 are subject to very strong purchaser credit quality consistent with a 'aa' rating factor assessment; between 1.5 and 2.4, strong credit quality or 'a'; between 2.5 and 3.4, midrange credit quality or 'bbb'; and above 3.4, weak or 'bb'.

In cases where a provider has a revenue source characteristic assessment of 'aa' but provides only a small portion of purchaser requirements, the PCQ assessment may be higher than the PCI indicates if a single purchaser exhibiting stronger credit quality could easily assume all contractual payment obligations of the other purchasers without affecting its credit quality.

Revenue Source Characteristics — 'a' or 'bbb'

The PCQ factor for wholesale providers with a revenue source characteristics assessment of 'a' or 'bbb' — because of a limited ability to reallocate costs — will reflect the credit quality of the weakest obligor(s), after factoring in mitigating structural features available to the utility that allow for the absorption of loss. These features include applicable step-up provisions, cash reserves or other credit enhancement provisions. Fitch will only rely on public and private ratings and credit opinions in these cases. Credit scores will not be considered.

Where features are insufficient to cover an individual purchaser's obligations in the event of its default, the PCQ factor assessment will be capped by the credit quality of that purchaser. For example, if a wholesaler's step-up provision is limited to 25% of a purchaser's obligation, that wholesaler's ability to meet debt service obligations would be highly reliant on payments from any purchaser with an allocated share higher than 20%. Stepping up the required payments from the non-defaulting purchasers responsible for less than 80% of contractual obligations by 25% would

not restore contractual obligations to 100%, resulting in a potential shortfall in revenue. If a wholesaler is highly reliant on more than one purchaser (i.e. each purchaser has an allocated share of more than 20%), the wholesaler's rating will be capped by the credit quality of the weakest of those purchasers. In each case, if the relevant purchasers are not rated, a notch-specific private rating will be assigned.

Fitch will evaluate the credit quality of a minimum number of purchasers who collectively account for contractual obligations sufficient to meet the wholesaler's obligations, after factoring in mitigating structural features. For example, in the scenario above where purchaser obligations may be increased up to 25%, purchasers responsible for at least 80% of the total contract obligations in aggregate would be evaluated, because implementing the 25% increase on the pool would restore contract obligations to 100%. The PCQ factor would then be assessed at a level commensurate with the weakest purchaser required to reach the 100% threshold after invoking the step-up protection. In evaluating the requisite purchasers, unrated purchasers will be assigned private ratings or credit opinions.

Alternatively, for wholesalers with 10 or more purchasers, Fitch will initially evaluate aggregate credit quality of the purchaser pool using its portfolio stress model (PSM), developed for assigning credit ratings to state revolving fund programs and municipal loan pools. The PSM produces liability stress hurdles based on the aggregate rating, obligation share and term of the purchasers. To capture the risk of large unrated purchasers, Fitch will assign credit opinions to all unrated purchasers with shares of more than 5% of the pool's contractual obligations, after factoring in available step-up protections.

The rating stress hurdle produced by the PSM is measured against the structural loss-absorption features of the contractual arrangement. The measurement determines whether or not sufficient resources, including contract payments, are available to the wholesaler to meet timely bond debt service payments while sustaining purchaser payment defaults. Please refer to "U.S. Public Finance State Revolving Fund and Municipal Finance Pool Program Rating Criteria" for more details.

Using the PSM, Fitch calculates the total expected loss — the liability stress hurdle multiplied by (1 minus the assumed recovery rate) — that can be sustained for each rating category. To be eligible for a certain rating category, the structural features and amount of loss absorption must exceed this expected loss. For example, if the characteristics of a pool of purchasers produce 'AAA' and 'AA' liability stress hurdles of 50.5% and 41.9%, respectively, and an assumed recovery of 90% is applied, then enhancement in excess of 5.1% (10% * 50.5%) and 4.2% (10% * 41.9%) would be necessary to achieve the respective rating category. Thus, if a utility was able to increase contractual obligations in amounts sufficient to absorb losses equal to 4.5%, the 'AA' stress hurdle of 4.2% would be met but the 'AAA' stress hurdle of 5.1% would not.

However, the relationship of the expected loss to the rating hurdle does not guarantee the PCQ factor will receive the corresponding assessment. Fitch also considers the effect of large individual purchasers and the leading role these obligors typically assume in managing these issuers. For example, while the wholesaler's PCQ assessment is capped at the credit quality of any single purchaser whose share exceeds the utility's loss protection, the assessment may also ultimately be capped by the credit quality of other rated purchasers.

In these cases, Fitch will begin with the lowest rated purchaser and aggregate the shares of individual purchasers by improving rating category to determine the rating of the purchaser whose share drives the aggregate share above the available protection. The PCQ factor assessment will be capped at the applicable rating. In the above scenario where available support is sufficient to cover losses totaling 5%, and the four weakest rated purchasers — each accounting for a 2% share — were rated 'BBB', 'BBB', 'A' and 'A', the PCQ factor assessment would be capped at 'A'. If the shares were instead 4% (BBB), 3% (BBB), 1% (A) and 1% (A), then the assessment would be capped at 'BBB'.

Revenue Defensibility Asymmetric Additive Risk Considerations

In addition to the aforementioned considerations, the assessment of revenue defensibility can be affected by the following.

In cases where a portion of a wholesale provider's revenues are derived pursuant to contracts that provide for conditional payments, including termination provisions, and the purchasers could reasonably be expected to replace such service, revenue defensibility is reduced. Revenue defensibility is also reduced in situations where the contracts do not extend through the maturity of outstanding debt and the purchasers could reasonably be expected to replace such service. Fitch will therefore consider in its analysis the tenor, relevant counterparties and terms of relevant contracts to assess the degree to which replacement funds - either from replacement contracts, uncontracted sales or wholesale rate increases - may be necessary to meet scheduled debt payments.

Fitch also examines wholesale utility revenue derived from non-monopoly operations, and the extent to which the utility relies on these revenues to meet covenanted revenue requirements and debt service obligations. Non-monopoly revenues are subject to higher volatility as a result of competitive pressures on both demand and price, and generally weaken revenue defensibility.

Operating Risks

The relevance of operating risk in Fitch's analysis of wholesale utilities will largely be determined by the degree to which resource performance and the cost of service influence the credit quality of the purchasers and their ability to support provider obligations. Operating risk is expected to be a meaningful factor in Fitch's analysis where wholesale providers are responsible for meeting the majority of purchaser service requirements. The assessment of operating risk for wholesale water and sewer providers focuses on operating cost burden and capital planning and management. Similar to the evaluation of retail utilities that own and manage their own water supply and treatment and/or sewer treatment and disposal facilities, the ability of a wholesale provider to consistently provide low-cost service enables purchasing retail utilities to achieve a strong financial profile, while preserving affordability.

Operating Cost Burden

Metric to Support Assessment
• Fitch measures a provider's ratio of total operating costs from a system's financial statement relative to its million gallons (mg) of water produced and/or sewer flows treated during the year to determine operating cost burden. Generally, wholesale utility systems with an operating cost of $6,500/mg or less have an operating cost factor assessment of 'aa'; over $6,500/mg to $9,500/mg, 'a'; over $9,500/mg to $12,500/mg, 'bbb'; and over $12,500/mg, 'bb'.
• Alternatively, Fitch may evaluate operating cost burden for partial requirement providers or single-asset providers by reviewing the relative magnitude of the cost and/or capacity as a percentage of the purchasers' total resources and related costs, as well as the strategic benefit or importance of the resource. Projects that account for less than 25% of purchaser cost or capacity, or provide significant strategic importance would be deemed to have a very low/low operating cost burden; projects that account for between 25% and 50% of cost or capacity, or provide no extraordinary strategic importance, midrange; and projects that are strategically burdensome, weak.

Fitch will initially assess operating cost burden for wholesale utilities and projects by comparing the ratio of total annual operating costs to total millions gallons of water produced and/or sewer flows treated on an average annual basis, which excludes distribution and collection costs borne by purchasers. When evaluating partial requirement providers and single-asset project providers, Fitch may alternatively assess operating cost burden by comparing the relative magnitude of project costs and capacity to the purchasers' total cost of water and/or sewer service requirements, or by assessing the strategic benefit or importance of the service. A lower ratio indicates a lower operating cost burden.

Fitch assesses capital planning and management for wholesale utilities using the same factors and metrics outlined on pages 8–11. Operating risk and cost flexibility risk are lesser considerations for wholesalers that provide only a small portion of purchaser requirements or operate a single asset, and where revenues are derived pursuant to take-or-pay contracts. In these cases, Fitch will evaluate the operating characteristics, but purchaser credit quality will be given greater consideration in the

determination of the final rating. A strong/very strong operating risk assessment could potentially enhance the rating above or toward the higher end of the PCQ rating factor assessment (e.g. A+ with a PCQ of A); whereas weaker operating risk could weigh the rating downward (e.g. A with a PCQ of A). In either case, however, any influence on the rating would be limited and reflect Fitch's determination of whether the obligations of the weaker purchasers would be assumed upon default given the inherent value of the resources and the incentive of the remaining purchasers to preserve the provider's credit quality.

Financial Profile

Fitch expects to use the same factors, metrics and scenario analysis outlined on pages 11–19 to evaluate the financial profile of most wholesale providers, including those with an unlimited ability to reallocate costs among purchasers to ensure cost recovery and revenue source characteristics assessed as 'aa'.

Focus on Purchaser Credit Quality

For utilities with revenue source characteristic assessments of 'a' and 'bbb' that possess only a limited ability to reallocate costs or provide only a portion of the purchaser's requirements, and benefit from a contractual framework in which revenues and costs are largely balanced and passed through to one or more purchasers, leverage profile may be less of a consideration in a rating. The PCQ rating factor assessment, supplemented by the operating risk assessment, will be more relevant to the final rating outcome in these cases.

Similarly in unique cases where an issuer possesses a revenue source characteristic assessment of 'aa' and supplies a portfolio of issuers that have been rated by Fitch - considering the full effect of the issuer's operating risk as well as its share of the issuer's obligations - the PCQ rating factor assessment may be more relevant to the final rating outcome than the issuer's own leverage profile.

Asymmetric Additive Risk Factors

Fitch considers the same asymmetric additional risk factors in its analysis of wholesale water and sewer utilities as outlined on pages 19–21.

Appendix C: Purchaser Credit Index Scoring Matrix

Credit scores for purchasing utility systems that are unrated or not subject to a credit opinion are determined using the *Purchaser Credit Index Scoring Matrix* below, together with evaluations of ability to absorb rate increases, net margin and cash cushion. Utilities that are rated or subject to a credit opinion may be assigned scores informed by their determined credit quality. Scores may also be informed by and assigned based on known facts that are not factored in the scoring matrix. In cases where data necessary to meet the assessments outlined below are insufficient, purchasing utilities may be assigned the lowest score.

Purchaser Credit Index Scoring Matrix

	Net Margin and Cash Cushion			
Ability to Absorb Rate Increases	**aa**	**a**	**bbb**	**bb**
aa	1	2	2	3
a	1	2	2	3
bbb	2	3	3	4
bb	3	3	4	4

Net Margin and Cash Cushion

Net margin and cash cushion measures a utility system's overall financial performance and readily available cash, after accounting for its purchased services, as well as any operating or financial obligations the utility may have incurred on its own.

Net Margin and Cash Cushion

Metrics to Support Assessment
• Fitch calculates the net margin and cash cushion as: (net margins + unrestricted cash and investments) / (average daily cash operating expenses), where net margin equals operating revenues less operating expenses plus non-operating revenues/(expenses) plus total contributions and transfers.
• Utility systems that have a net margin and cash cushion of 170 days or more have a 'aa' factor assessment; between 70 days and 169 days, 'a'; between 30 days and 69 days, 'bbb'; and less than 30 days, 'bb'. However, systems with debt/FADS in excess of 7.0x cannot be assessed higher than 'a'.

FADS – Funds available for debt service.

Ability to Absorb Rate Increases

For credit scoring purposes, the ability to absorb rate increases of a purchasing utility is determined using the following matrices, which assess the utility's service area and rate flexibility, in the context of its legal ability to set rates for service.

Ability to Absorb Rate Increases

Ability to Set Rates:	Yes			
	Service Area Characteristics			
Rate Flexibility	**aa**	**a**	**bbb**	**bb**
aa	aa	aa	a	a
a	aa	aa	a	a
bbb	a	a	a	bbb
bb	a	a	bbb	bbb
Ability to Set Rates:	No			

Ability to Absorb Rate Increases

	Service Area Characteristics			
Rate Flexibility	**aa**	**a**	**bbb**	**bb**
aa	aa	a	a	a
a	a	a	a	bbb
bbb	a	a	bbb	bbb
bb	a	bbb	bbb	bb

Service Area Characteristics

Fitch's scoring methodology evaluates a utility's service area and the ability of its customers to support purchased services by measuring three characteristics: median household income, unemployment and customer growth. Each of these characteristics is separately assessed against nationwide averages or other thresholds.

Service Area Characteristics

(%, Metrics to Support Assessment)	Stronger	Midrange	Weaker
Median Household Income/U.S. Average Median Household Income	> 125	125–75	< 75
Unemployment Rate/U.S. Unemployment Rate	< 75	75–125	> 125
Historical Average Annual Customer Growth Rate[a]	> 1.5	1.5–0.0	< 0.0

- Utilities that exhibit characteristics that are all considered midrange are considered to be consistent with an 'a' assessment; utilities that exhibit a greater number of stronger characteristics than weaker characteristics are considered to be consistent with a 'aa' assessment; utilities that exhibit a greater number of weaker characteristics than stronger characteristic would be assessed as 'bbb'.

[a]Typically over a five-year period.

Rate Flexibility

Fitch's scoring methodology evaluates a purchasing utility's rate flexibility and its ability to generate additional revenue to support purchased service requirements by assessing independent rate-setting authority and rate affordability as represented by the percentage of people whose water-related utility charges are considered unaffordable.

Affordability

Metric to Support Assessment
• Fitch calculates an affordability rate to determine the number of people whose bills account for an outsized portion of their income. Generally, a combined water-related bill that is greater than 5% of household income (or individually, 2.0% for water, 2.5% for sewer and 0.5% for stormwater) is considered unaffordable. Utilities with 20% or less of their population whose bills are considered high are deemed to have an affordability assessment factor of 'aa'; over 20% to 30%, 'a'; over 30% to 40%, 'bbb'; and over 40%, 'bb'.

Appendix D: Pension Treatment in Leverage Metrics

Utility systems vary considerably in the types of pension benefits offered to workers, which also affects whether and how Fitch incorporates pensions in its analysis of an entity's financial flexibility. Utilities with defined-benefit (DB) pensions carry a financial obligation that is long term in nature, and uncertain in timing and amounts to be paid. Ongoing employer and employee contributions, which accumulate as invested assets in a trust fund and generate investment returns, are the primary sources for funding benefits and offsetting the pension liability incurred by a utility. Through a series of actuarial calculations that can vary, the present value of the pension obligation accrued to date can be compared to the invested assets available to meet the obligation. An excess of that liability over the invested assets value represents the unfunded portion of the pension obligation that has accrued (generally reported as the net pension liability [NPL] by the utility under GASB pension accounting standards). In some cases, a utility will be a participant in a multi-employer plan, and the employer's share of that calculated liability will be considered in the analysis.

Fitch views the unfunded balance of accrued DB pension liability as a debt-equivalent obligation. The size of the reported liability and the annual payments necessary to amortize it can be subject to a range of institutional decisions regarding benefit levels and actuarial assumptions, economic trends and statutory considerations. Changes in these factors may affect the size of the unfunded liability over time. However, the most important drivers of unfunded liability tend to be the level of actual returns on the investment portfolio supporting the pension when compared to a target return and the adequacy of the employer contribution actually made. Fitch will review the reported unfunded liability over time versus point in time. Material volatility in a plan's asset values due to market movement is less relevant to Fitch's assessment of pension-related risk than is the plan's longer-term prospects for funding improvement over time.

GASB or FASB: Institutions in the sector include both public-sector enterprises that follow GASB accounting rules and not-for- profit enterprises that follow FASB accounting rules; additionally, the pensions of most not-for-profit enterprises are subject to federal regulation. There are differences in the calculation and reporting of the unfunded pension liability between GASB and FASB. Public-sector (GASB) DB pension plans are unique in using their long-term investment return assumption as the liability discount rate. In contrast, private (FASB) plans use a low, variable, regulated discount rate tied to market rates, with some relief post-2009, distinct from the investment return assumption in calculating their liability. As such, there is a fundamental difference in reported unfunded pension liability between ERISA-regulated FASB plans and public-sector GASB plans that Fitch believes must be reflected in the analysis to support comparability. The calculation of the related pension liability, if any, to be added to an institution's adjusted debt varies as described below. Notwithstanding this difference, the calculations and adjustments made by Fitch are intended to create equivalency to the leverage assessment, regardless of the accounting methodology applied.

Public-Sector DB Pensions: Public-sector DB pensions represent a source of uncertainty given the absence of uniform regulations that compels progress on prefunding, the irrevocable nature of vested benefits and the variability of reported liabilities. These factors in combination have led to the accretion of long-term liabilities and a rising demand for contributions.

Fitch applies the same approach to pension liability of a public-sector enterprise as it does when considering pension obligations of state and local governments. For public enterprises, the primary credit risk of DB pensions is in the accumulation of long-term liabilities. There is no uniform regulation of funding practices and the liability can accrete under multiple circumstances, including due to underperformance of assets, failure to achieve actuarial and economic assumptions, and inadequate annual contributions. Bankruptcy is possible but rare, and liquidation is improbable due to legal constraints. Fitch's baseline assumption is that vested benefits are irrevocable, and that benefits can be changed only for new hires.

The starting point for this analysis is the pension data as disclosed by the institution. To convey more effectively the magnitude of risks associated with public DB plans, and to improve comparability across plans, Fitch adjusts the reported NPL upward to reflect a 6% discount rate, if the NPL is based on a higher discount rate; this approach is identical to the adjustment to NPLs outlined in Fitch's "U.S. Public Finance Tax-Supported Rating Criteria." The resulting adjusted NPL is combined with debt obligations in Fitch's assessment of financial flexibility. In some cases, an enterprise without audited financial statements separate from its primary government may not report detailed pension liability data, as for example when the primary government participates in several pension plans. In such cases, Fitch will adjust the institution's reported NPL for purposes of its analysis based on the primary government's main or general employee plan.

Allocating Multi-Employer Liabilities under GASB 68: Although some public-sector enterprises may directly sponsor and manage a DB pension plan, many provide pension benefits as part of a larger cost-sharing, multi-employer system, or within a single-employer system that provides benefits to a primary government and its separate enterprises. As such, the ability of water and sewer utilities to influence pensions is often limited, as decisions on benefits, assumptions and contributions are made by a legislature, local government or pension board. In these cases, multi-employer plan assets are not legally separated by employer. A single actuarial valuation is performed and the resulting NPL, expense, and deferred inflows and outflows for all participating entities are allocated proportionally, based on the pension's contribution practices. Each participating employer's audit contains only its proportionate share.

GASB 68's allocation method informs Fitch's approach to assessing liabilities in a cost-sharing plan or a single-employer plan allocated to one or more enterprises. GASB 68's default assumption is that the liability is assigned where the obligation is required to be funded, generally by the participating employers. The standard considers pensions to be deferred compensation for which the direct employer is ultimately obligated. Fitch follows GASB 68 reporting for the liability allocation because the methodology is consistent with our expectations for how pension plans function, including how they resolve funding challenges.

The fact that most cost-sharing, multi-employer plans are state-sponsored does not mean that the unfunded liabilities of the plans are responsibilities of the state or of the pension system itself. In some cases, the state has explicit legal and fiscal responsibility for plan funding, and Fitch allocates a share of the liability to the state accordingly, rather than to other participating employers. However, it is much more common for a state to take responsibility only for liabilities associated with its direct employees. Even in cases where they have historically provided support for related governments in the plans, states generally retain the option to pull back on this support. Fitch does not shift the reported liability away from the institution based on this support where GASB 68 assigns it to an institution. However, as noted below, where there is a longstanding history of direct support and through funding provided to a class of employers from the state, Fitch does account for this in its analysis.

Treatment of State Support of Public-Pension Obligation in the Leverage Assessment: Fitch relies on the pension liability data as reported by the institution when assessing its liability burdens. Some public institutions report special funding situations, under which states assume some or all of an NPL, and Fitch's analysis reflects such support. In rare instances that fall short of a special funding situation, but where consistent, explicit state subsidy of pensions is provided, Fitch may modify its assessment of leverage to reflect the presence of state appropriations supporting all or part of an enterprise's pension liability.

Indicators of explicit state support might include a state making employer contributions on behalf of the utility for the DB plans available to employees, but under a funding mechanism that does not meet the requirement for special funding under GASB's approach. Such mechanisms may include annual appropriation, statute or specific authorizing legislation.

FASB Plans: Some utility systems may offer DB pensions whose pensions are subject to federal regulations, which have shifted considerably in recent years and continue to evolve. Fitch generally expects these issuers to manage their pensions within the existing regulatory framework, which

includes provisions for calculating contributions and premiums for mandatory federal pension insurance.

Fitch's starting point for the pension analysis is the projected benefit obligation (PBO) as reported by the issuer, and for purposes of assessing leverage within the FAST analysis, Fitch recalculates the funded status assuming 80% of the PBO. Any resulting adjusted pension deficit is added to debt obligations in Fitch's forward-looking assessment of the financial flexibility. This adjustment to the PBO is intended to serve only as a proxy for capturing the impact of regulations on how pensions are likely to be funded, rather than a precise recalculation of actual liabilities.

The regulatory environment encourages issuers to manage to an 80% funded ratio utilizing generally conservative investment return assumptions. Funding to 80% based on a lower discount rate generally corresponds to nearly fully funded levels using a normalized 6% long-term return assumption. If the regulatory environment shifts, Fitch will modify its approach to take into account the expected impact of these changes on a forward-looking basis. Fitch may also incorporate pension contributions and other pension-related cash outflows in the stress case scenario to fully capture near-term liquidity risks from DB pension plans.

Other utilities participate in multi-employer DB pension plans that, while regulated, are jointly sponsored with organized labor and disclose only limited information. For multi-employer DB pensions, clarity on the status of pensions or their likely impact on finances may be limited. If such pensions represent, in Fitch's view, a material risk in its assessment of a health provider's financial profile, they could be reflected as an asymmetric risk factor (see *Information Quality* section on page 21).