BEFORE THE
CALIFORNIA PUBLIC UTILITY COMMISSION

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Application of Great Oaks Water Company (U-162-W) for an Order establishing its authorized cost of capital for the period from July 1, 2024 through June 30, 2027.	))))	Application No. ____________
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DIRECT TESTIMONY
OF
MICHAEL R. TOLLETH

May 1, 2023

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DIRECT TESTIMONY OF MICHAEL R. TOLLETH

I. INTRODUCTION AND PURPOSE

Q1. Please state your name, occupation, and business address.

A1. My name is Michael Tolleth. I am a Principal of The Brattle Group, an economic and management consultancy with offices in North America, Europe, and Asia Pacific. My business address is 7 Times Square, Suite 1700, New York, NY 10036.

Q2. Please summarize your professional qualifications.

A2. I have nearly 10 years of experience as an economic consultant, including analysis of the cost of capital for regulated companies in the utilities, pipeline, and railroad industries, as well as for valuation and marginal cost pricing applications. I have submitted testimony and expert reports on cost of capital and other regulatory finance and ratemaking matters before the California Public Utilities Commission ("CPUC" or the "Commission") as well as the Canada Energy Regulator (CER), the U.S. Federal Energy Regulatory Commission (FERC), the Regulatory Commission of Alaska (RCA), and the British Columbia Utilities Commission (BCUC). I have also contributed to expert reports on financing costs in unregulated infrastructure industries such as electric generation and crude oil marketing, and have testified on contract valuation before the Alberta Court of King's Bench.

I hold an M.B.A. with concentrations in finance, economics, and statistics from the University of Chicago Booth School of Business. I also hold a B.S. in chemical physics from the University of California, San Diego. Additional details of my professional and educational background and a list of my testimonies and publications are contained in my resume, which is presented as Attachment MRT-1 to this testimony.

Q3. What is the purpose of your testimony in this proceeding?

A3. I have been asked by Great Oaks Water Company ("Great Oaks" or "the Company") to estimate the rate of return that Great Oaks should be afforded the opportunity to earn on the equity financed portion of its rate base, in accordance with the finance principles underlying the legal standards for establishing a fair return under the CPUC's regulation of Great Oaks' rates. Specifically, I provide return on equity ("ROE") estimates derived from market data for a sample of regulated water utility companies, and additional estimates based on an analysis of historical risk premiums. I then consider specific circumstances and risk factors for Great Oaks compared to the sample companies to inform my allowed ROE recommendation.

Q4. Does your testimony rely on the testimony of any other witnesses?

A4. Yes. I rely on and reference information presented by company witnesses Mr. John Roeder and Mr. Timothy Guster. [1]

Q5. Have you testified on behalf of Great Oaks previously?

A5. Yes. I filed prepared direct and rebuttal testimony in CPUC proceeding A.18-05-001,[2] which was Great Oaks' most recent cost of capital application prior to this one.

II. SUMMARY OF CONCLUSIONS

Q6. Please summarize the primary conclusions of your testimony.

A6. Based on my application of standard cost of capital models to a representative sample of publicly-traded water utility companies, I find that a ROE in the upper end of the range

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1 *See* Great Oaks' Application, Exhibit D - Testimony of John Roeder ("Roader Testimony") and Exhibit E - Testimony of Timothy S. Guster ("Guster Testimony").

2 *See*, A.18-05-001: Application of Great Oaks Water Company (U-162-W) for an Order establishing its authorized cost of capital for the period from July 1, 2019 through June 30, 2022, Exhibit C: Testimony of Michael R. Tolleth.

8 ¾ to 10 percent[3] is reasonable for a regulated water distribution utility with Great Oaks' business risk profile, and in conjunction with its requested regulatory capital structure of 70% equity and 30% debt.

My selection of the reasonable range is based on results in the range 8 ½ to 10 percent from the CAPM-based models and 8 ¾ to 9 ¾ percent from the DCF model and considering a result of 10 percent from my implementation of an Implied Risk Premium analysis. In consideration of Great Oaks' small size and higher than average regulatory risk compared to the sample companies, I conclude that an allowed ROE at the mid-point of the upper half of my recommended range 8 ¾ to 10 percent is appropriate for Great Oaks. I therefore recommend that Great Oaks receive an allowed ROE of 9.7 percent.

Q7. How is the remainder of your testimony organized?

A7. Section III formally defines the cost of capital and explains the techniques for estimating it in the context of utility rate regulation. Section IV discusses conditions and trends in capital markets and their impact on the cost of capital. Section V explains my analyses and results. Finally, Section VI discusses the business risk characteristics of Great Oaks and my conclusions regarding a reasonable allowed ROE for the Company.

III. COST OF CAPITAL PRINCIPLES & APPROACH

A. THE COST OF CAPITAL IN UTILITY RATE REGULATION

Q8. What are the guiding standards that define a just and reasonable allowed rate of return on rate-regulated utility investments?

A8. The seminal guidance on this topic was provided by the U.S. Supreme Court in the *Hope* and *Bluefield* cases,[4] which found that:

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3 Note that while I report my model results and calculations to the tenth of a percent, I present reasonable ranges in increments of ¼ percentage points. This reflects my belief that while the models are valid and informative, the calculations and techniques are not sufficiently precise (in a statistical sense) to pinpoint the cost of equity to multiple decimal places, and that informed judgment is required to draw inferences from the model results.

4 *Bluefield Water Works & Improvement Co. v. Public Service Com'n of West Virginia*, 262 U.S. 679 (1923) ("Bluefield"), and *Federal Power Com'n v. Hope Natural Gas Co.*, 320 U.S. 591 (1944) ("*Hope*").

- The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks;[5]
- The return should be reasonably sufficient to assure confidence in the financial soundness of the utility; and
- The return should be adequate, under efficient and economical management for the utility to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[6]

Q9. How does the standard for just and reasonable rate of return relate to the cost of capital?

A9. The first component of the *Hope* and *Bluefield* standard, as articulated above, is directly aligned with the financial concept of the opportunity cost of capital.[7] The cost of capital is the rate of return investors can expect to earn in capital markets on alternative investments of equivalent risk.[8]

By investing in a regulated utility asset, investors are tying up some capital in that investment, thereby foregoing alternative investment opportunities. Hence, the investors are incurring an "opportunity cost" equal to the returns available on those alternative investments. If the allowed return on the utility investment is not at least as high as the expected return offered by alternative investments of equivalent risk, investors will choose these alternatives instead, and the utility's ability to raise capital and adequately fund its operations will be adversely impacted or even prevented. This is a fundamental concept in cost of capital proceedings for regulated utilities such as Great Oaks.

Thus, from an economic perspective, allowed return levels that give investors a fair opportunity to earn the cost of capital are the lowest levels that compensate investors for

[5] *Hope*, 320 U.S. at 603.

[6] *Bluefield*, 262 U.S. at 680.

[7] A formal link between the opportunity cost of capital as defined by financial economics and the proper expected rate of return for utilities is set forth by Stewart C. Myers, "Application of Finance Theory to Public Utility Rate Cases," *Bell Journal of Economics & Management Science* 3:58-97 (1972).

[8] The opportunity cost of capital is also referred to as simply the "cost of capital," and can be equivalently described in terms of the "required return" needed to attract investment in a particular security or other asset (*i.e.*, the level of expected return at which investors will find that asset at least as attractive as an alternative investment).

the risks they bear. It has consequently become routine in utility rate regulation to accept the cost of capital as a fundamental determinant of the appropriate allowed return. Indeed, the California Public Utilities Commission has often recognized the relationship between the opportunity cost of capital and the establishment of fair returns and reasonable rates.[9]

Q10. Do these same principles apply in the context of setting rates for a small family-owned utility such as Great Oaks?

A10. Yes. In practice Great Oaks has only a single investor—its owner Mr. John Roeder. However, his investment in Great Oaks must provide a fair return commensurate with the risk of the enterprise, or else—like any other investor in an enterprise of any size—he would face a disincentive to invest in the utility instead of seeking better returns from alternative investments. Similarly, if it became desirable or necessary to raise funds from third-party (*e.g.*, by taking a bank loan or receiving an equity investment from a minority partner), Mr. Roeder would only be able to do so under reasonable terms if the financial soundness of Great Oaks' operations reflect the opportunity to earn a fair return equal to the opportunity cost of capital.

These aspects of Great Oaks' ownership structure and financial circumstances differentiate the company from all of the other Class A water companies. Notably, the Commission's mandate and precedents require it to "consider company-specific factors," even when the application of one regulated utility is consolidated with applications of other regulated water companies (as is the case in this here).[10] Therefore, the CPUC must assess the risk of *Great Oaks* as a particular enterprise—in comparison to other water utilities for which the cost of capital can be measured or applied—when determining the fair rate of return on equity to be applied to Great Oaks rate base for ratemaking purposes.

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[9] *See, e.g.*, D.12-12-034, at p. 18 ("We attempt to set the ROE at a level of return commensurate with market returns on investments having corresponding risks, and adequate to enable a utility to attract investors to finance the replacement and expansion of a utility's facilities to fulfill its public utility service obligation. To accomplish this objective, we have consistently evaluated analytical financial models as a starting point to arrive at a fair ROE.").

[10] *See*, D.07-05-062, at p. 15.

Q11. Can you provide an example to illustrate how market prices are determined in response to investors' opportunity cost of capital?

A11. Yes. Consider an investment asset (Asset A) that is guaranteed to be worth $100 one year in the future. What should a rational investor be willing to pay to acquire this asset today? Assuming the asset has no practical utility in the intervening year, this question depends on what *else* an investor could do with the money for that year.

Supposing an alternative investment vehicle exists (*e.g.*, a savings account) that offers a guaranteed 2.0 percent annual interest rate (Investment B), the rational investor will require a return at least this high to invest in Asset A.

Consequently, the investor should be willing to pay no more than $98.04 to acquire Asset A today, since at this price, the gain from selling for $100 in one year will be exactly 2.0 percent.[11]

Furthermore, in a competitive capital market where all investors have access to the same investment opportunities, today's market price for Asset A will be *exactly* $98.04, since (i) no investor would buy it above that price, and (ii) if it were offered for sale at *less* than $98.04—offering investors an expected return above that available from the alternative (Investment B)—investors would bid up the price in competing efforts to buy it.

In this example, the 2.0 percent risk-free interest rate offered by Investment B is the opportunity cost of capital for an investment in Asset A. Put differently this is the rate of return that compensates investors for the "time value of money," ensuring that the market values at $98.04 today an asset that will be worth $100 one year from now.

B. RISK AND THE COST OF CAPITAL

Q12. What is the role of risk in determining the cost of capital?

A12. Investors are risk-averse and therefore perceive a trade-off between risk and expected return. Holding all other factors equal, investors will require a greater expected return to take on a riskier investment. Put another way, two investments offering the same expected return are not necessarily equally attractive to investors, since one investment may impose

[11] ($100.00 - $98.04) / $99.04 = 2.0%

greater risk than the other. This is why the cost of capital represents the expected rate of return on alternative investments *of equivalent risk*.

Q13. How is risk defined in this context?

A13. In finance, risk is defined in terms of the uncertainty surrounding the returns on an investment. For example, consider an extension of the illustrative example discussed in Section III.A above. Assume there exists an "Asset C" that will take on one of three values in one year's time:

- $110 in an "up" market, which has a 1/3 chance of occurring
- $100 in a "neutral" market, which has a 1/3 chance of occurring
- $90 in a "down" market, which has a 1/3 chance of occurring

The expected value of Asset C in one year is $100, since it has equal probabilities of being worth $10 more or less than that value (or of being worth exactly $100).[12] Thus, Asset A and Asset C have the same expected value. However, unlike Asset A, which is guaranteed to be worth exactly $100, there is some uncertainty about what Asset C will be worth one year from now. Investing in Asset C is risky, while Asset A is risk-free.

Q14. How does the opportunity cost of capital compare for the risky investment versus the risk-free investment in your example?

A14. Given a choice between the two investments, risk-averse investors will prefer to own Asset A, since it provides the same expected value with no risk that it will be worth more or less than expected.[13] Consequently, the market price of Asset C will be lower than that of Asset A, meaning the expected return will be higher.

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[12] Throughout this testimony, the term "expected value" has a precise mathematical meaning, namely the weighted average of all possible future values an asset or investment may take on, where the weights are the probabilities of those values occurring. Similarly, an "expected return" refers to the probability-weighted average of all possible return outcomes. In this specific example the expected value of Asset C is calculated as $\frac{1}{3} \times \$110 + \frac{1}{3} \times \$100 + \frac{1}{3} \times \$90 = \$100$.

[13] Note that in finance the concept of risk refers to uncertainty about both negative *and positive* outcomes. Risk-averse investors prefer more certain in investment outcomes, even compared to investments with uncertainty on *both* the upside and the downside. Economic research suggests that most investors are risk-averse because the loss of "utility" (loosely defined as economic well-being) from a negative change in wealth is typically greater than the utility gain from an equivalent increase in wealth. Put simply, losing $10 is more negative than gaining $10 is positive.

Put another way, while the risk-free interest rate on alternative Investment B effectively sets investors' required rate of return for investing in riskless Asset A at 2.0 percent, it does not represent the opportunity cost of capital for a potential investment in risky Asset C. The collective investment decisions of market participants will set Asset C's price below Asset A's price to ensure a higher—but also less certain—expected return.

A *risk premium* is the amount by which investors' required return on a particular risky asset exceeds the risk-free rate of return. Exactly what the risk premium will be for a given risky asset (such as Asset C in our example) depends on what expected returns are available in the market for alternative investments with comparable levels of risk. Thus, any reliable estimate of the cost of capital must consider the specific risk profile of the enterprise under consideration—in this case Great Oaks' water utility business. Accordingly, I take the unique circumstances and differentiating risk factors for Great Oaks as compared to other water utility companies into account when selecting my recommendation for Great Oaks allowed ROE. (See Section VI.A below.)

Q15. What is systematic risk?

A15. Systematic risk—also known as market risk—is the tendency of an asset's value to change in proportion to a given change in the aggregate value of assets in the broader market. In finance, an asset's systematic risk is measured by its market *beta*. A higher beta indicates greater sensitivity of an investment's value to changes in market value, and thus greater systematic risk.

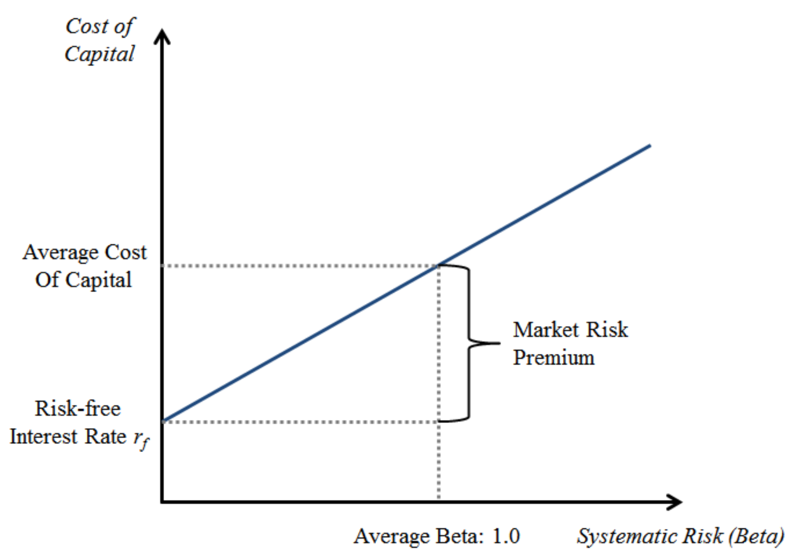
Q16. Why is systematic risk relevant to the cost of capital?

A16. The concept of systematic risk is important because individual investors can reduce their overall risk exposure by *diversifying* their portfolio of risky investments. When many separate and varied risky assets are part of a portfolio, they do not all change in value in the same direction at the same time. Thus, the risk of the portfolio is less than the sum of the risk of the individual investments. The most diversified possible portfolio is a combination of *all* risky investments available in capital markets, each held in proportion to its share of the total market value. This is the so-called "market portfolio."

Finance theory holds that investors are not compensated for risk they can "diversify away." Rather, assets are priced in the market so that investors will earn returns sufficient to compensate for each asset's *contribution* to the risk of the overall market portfolio. In other words, the risk premiums for individual assets depend on their systematic risk.

In particular, modern finance posits a linear tradeoff between systematic risk and return known as the "security market line" ("SML"). As depicted in Figure 1, the risk premium for a given investment is directly proportional to its systematic risk as measured by market beta. The SML is the plot of each risky security's cost of capital as a function of its market beta. The vertical axis intercept of the SML is the risk-free interest rate, indicating that for an asset with no systematic risk (*i.e.*, beta of 0) no risk premium is required. The slope of the SML is the risk premium on the market portfolio, which, by definition, has a beta of 1.

Figure 1
The Security Market Line



Q17. What factors contribute to systematic risk for an equity investment?

A17. When estimating the cost of equity for a given asset or business venture, two categories of systematic risk are important. The first is **business risk**, which is the degree to which the cash flows generated by the business (and its assets) vary in response to moves in the broader market. Business risk can be quantified in terms of an "assets beta" or "unlevered beta." For a company with an assets beta of 1, the value of its enterprise will increase (decrease) by 1% for a 1% increase (decline) in the market index.

The second category of risk relevant for an equity investment depends on how the business enterprise is financed and is called **financial risk**. The following subsection explains how financial risk affects the systematic risk of equity.

C. FINANCIAL RISK AND THE COST OF EQUITY

Q18. How does financing affect the risk faced by investors?

A18. The most common sources of financing for long-term capital assets are debt and common equity. Debt financing is provided in the form of loans or proceeds from the sale of bonds. In exchange for these funds, a debt-financed firm compensates debt-holders by making pre-determined interest or coupon payments and agrees to repay the loan (or bond) principal at the end of the contract term. In contrast, equity investors provide financing in exchange for a share of the company's future profits.

Importantly, debt investors receive their interest and principal payments first, before any cash flows can be distributed to equity holders. In this sense, debt holders are "senior" in the firm's capital structure, and common equity investors are entitled to only the "residual" share of the firm's cash flow—what is left over after the firm's fixed debt obligations have been met.

The consequence of this structure is that debt investors face less risk than equity investors. Debt holders are only concerned with variability in expected cash flows to the extent they may be insufficient to cover the fixed interest and principal payments specified in the debt contract. Equity holders, meanwhile, bear the "residual risk" associated with their residual claim. Moreover, as the proportion of debt financing in the firm's capital structure increases, so does the financial risk experienced by the equity investors holding the residual share.

Q19. Can you illustrate how greater proportions of debt financing increase equity risk?

A19. Yes. Return once again to the example of Asset C, which has an expected value of $100 one year from now but may also have a value 10% higher or lower than that, depending on the state of the market.[14] Now imagine several alternative structures for financing Asset C, varying only in terms of the proportion of the expected value that is owed to debt holders.

As shown in column [1] of Figure 2 below, an all-equity capital structure (with $0 of debt financing) will provide equity holders with $110, $100, or $90 of value next year. Therefore, the potential variability in the equity value (+/- 10%) is the same as the variability in the value of the asset itself.

Figure 2
Impact of Debt Financing on Equity Risk

Debt-to-Expected Value Ratio		**0%**	**25%**	**50%**	**67%**	**75%**
		[1]	[2]	[3]	[4]	[5]
Asset Value in "Up" Market	[a]			$110		
Expected Value of Asset	**[b]**			**$100**		
Asset Value in "Down" Market	[c]			$90		
Debt Value	[d]	$0	$25	$50	$67	$75
Equity Value in "Up" Market	[e] = [a] - [d]	$110	$85	$60	$43	$35
Expected Value of Equity	[f] = [b] - [d]	**$100**	**$75**	**$50**	**$33**	**$25**
Equity Value in "Down" Market	[g] = [c] - [d]	$90	$65	$40	$23	$15
% Variability in Equity Value	[h] = $10 / [f]	**+/- 10.0%**	**+/- 13.3%**	**+/- 20.0%**	**+/- 30.0%**	**+/- 40.0%**

However, if the asset is instead financed with $25 of debt principal (due next year) as shown in column [2] of Figure 2, then the expected value of the residual equity share will be $75. Since the fixed debt payment doesn't change in the "up" and "down" market outcomes, the equity investors experience the full upside or downside of the +/- 10% change in the value of Asset C. But importantly, $10 in either direction represents a larger *proportional* change relative to the $75 expected equity value as compared to the full $100 value of the asset. Under this financing structure, the variability associated with the equity value is +/- 13.3%, even though the value of the asset itself may only vary by +/- 10%.

As illustrated in Figure 2, increasing the proportion of debt financing increases the proportional variability in equity value. This is because debt financing acts as "financial leverage" for equity investors—causing them to absorb all of the (upside or downside)

[14] If we further assume that a 10% increase (decrease) in the value of Asset C would correspond specifically to a 10% increase (decrease) in the market index, then we can say that Asset C has an "asset beta" of 1.0.

variance in the expected value of the asset over a base equity investment that is less than the full value of the asset. In this manner, the use of debt financing introduces financial leverage into the capital structure and imposes financial risk on equity holders.

Q20. Why is it important to consider capital structure and its effect on financial risk when estimating the cost of equity?

A20. Companies with different capital structures will have different degrees of financial risk. Consequently, even if two companies have identical business risk, their stockholders may face very different levels of overall systematic risk, and therefore have very different required returns.

Conversely, even if the estimated market cost of equity (or equity beta) for two different companies is the same, it is not proper to infer that the two firms have same degree of business risk unless they also happen have the same degree of financial risk (*i.e.,* they have the same capital structure).

When attempting to measure and compare risk premiums associated with certain business risk characteristics (such as those particular to regulated water utility operations), it is therefore essential to consider and adjust for any differences in financial leverage among the companies for which the cost of equity is to be measured and/or applied.

Q21. How does the relationship between capital structure and financial risk holders apply in the context of a small family-owned utility like Great Oaks?

A21. As discussed below in Section VI.A, Great Oaks' small size increases its risk relative to larger companies whose greater scale enables them to mitigate variability in cash flows arising from unexpected changes in revenue or costs. It's private ownership and small financial size also constrain its access to capital markets and limiting its options in obtaining financing to deal with unexpected shocks to income or required investment, thus increasing Great Oaks' financial risk.

Given these unique circumstances, it is appropriate that Great Oaks maintains a relatively high proportion of equity (70%) in its capital structure. By committing less of its value and cash flow to fixed debt financing obligations, Great Oaks maintains greater financial flexibility and reduces the variability in returns to its owners' equity, relative to a utility with a more debt-laden capital structure (e.g., 50% equity / 50% debt). Put differently, by maintaining a relatively equity-rich capital structure—and employing that capital structure for CPUC ratemaking purposes—Great Oaks' is structured in such a way as to somewhat reduce its financial risk and help mitigate some of the elevated business risk that is inherent in operating a comparatively small water utility.

As is the case for any utility—and indeed any investor-owned company—Great Oaks' required return on equity would be higher if it were financed with a greater degree of financial leverage. Accordingly, if the Commission were to determine that Great Oaks' revenue requirement should be calculated based on a regulatory capital structure with less equity (and more debt) than its current 70% equity / 30% debt capital structure, the corresponding required return on equity would increase above the levels I derive and recommend below.

D. Approach to Estimating The Cost of Equity

Q22. How do you employ market data in estimating the cost of equity for Great Oaks?

A22. I employ standard finance models, including versions of the Discounted Cash Flow (DCF) model and the Capital Asset Pricing Model (CAPM). Based on principles of capital market equilibrium, these models can be used to estimate the cost of equity for companies with publicly-traded stock. For so-called "risk positioning" models such as the CAPM, movements in stock prices are used to derive information about systematic risk (*i.e.*, as measured by betas) and the associated risk premiums as depicted in the Security Market Line. In the case of the DCF, the cost of equity is inferred from the relationship between the market price of a stock and the cash flows stockholders can expect to receive in the future.

Q23. Given that Great Oaks is privately held and does not have publicly traded stock, why is it appropriate to use these capital market models that rely on stock market information?

A23. Unlike the cost of debt, which can be read from the interest rate on a loan or the yield on a bond, the cost of equity is not directly observable. Equity represents a claim on the profits of a business. As such, the rate of return equity investors expect to receive (i.e., the cost of equity) depends on the price they pay for their ownership share and the profits they expect to receive. Therefore, in order to infer the market cost of equity, it is necessary to know the market price that investors pay to purchase equity. This, in turn, requires observation of a market transaction (preferably many such transactions) where an equity stake is bought and sold at a known price. Accordingly, liquid stock exchanges provide the greatest opportunity to obtain enough capital market data to infer how investors required returns are informed by—and help to determine—the market prices of equity investments.

Q24. How do you account for risk when implementing these models to estimate the cost of equity?

A24. As described above, both business and financial risk are important determinants of the systematic market risk that affects the cost of equity capital. To ensure that the publicly traded sample companies for which I perform DCF and CAPM estimates have business risk characteristics relevant to Great Oaks, I select a proxy group of publicly-traded companies with regulated water utility operations.

To appropriately control for the effects of capital structure on financial risk—and therefore on the cost of equity—I employ standard finance techniques to adjust for differences in financial risk arising from the degree of debt financing (financial leverage) in the capital structure. These calculations account for differences in financial leverage among the sample companies, allowing me to calculate averages for the sample that reflect the companies' levels of business risk independent of differences in financial risk. The standard techniques also account for differences between the levels of financial risk imposed by the market value capital structures of the sample companies compared to the regulatory capital structure used to set Great Oaks' revenue requirement.

Finally, to determine where the Company's allowed ROE should be situated within the reasonable range of cost of equity estimates derived from the model, I consider the business risk characteristics of Great Oaks (as a very small privately-held utility) relative to those of the publicly-traded sample companies.

IV. CAPITAL MARKET CONDITIONS AND THE COST OF CAPITAL

Q25. How are capital market conditions relevant to estimating the cost of capital?

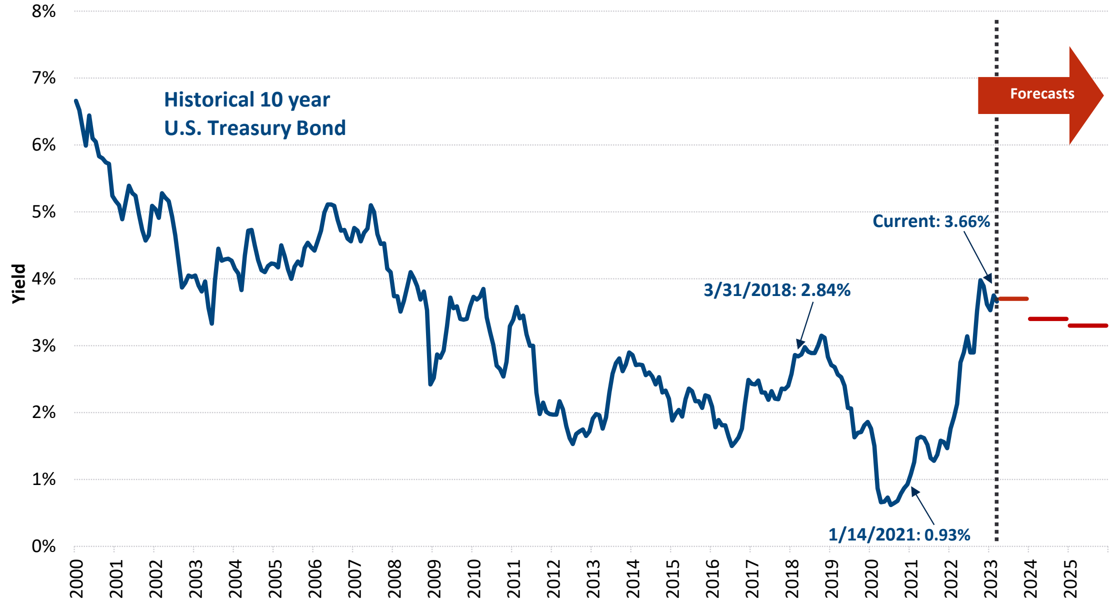
A25. As discussed in Section III above, the cost of capital is a market concept. It is through the market mechanism that investors—through the action of their aggregate investment decisions—determine the prices of securities such that they expect to earn their required return. Furthermore, as described further in Section V below, the standard finance models for estimating the cost of equity rely on inputs that vary as economic conditions change and evolve. In particular, the CAPM and other risk-positioning models require as inputs estimates of the risk-free interest rate and the Market Risk Premium. Consequently, in this section I discuss recent and forward-looking developments related to estimation of these quantities.

Q26. What are the relevant developments regarding risk-free interest rates since the time of your 2018 testimony?

A26. At the time of my 2018 testimony, interest rates—including long-term government bond yields had been increasing relative to the sustained lows experienced in the decade following the great financial crisis of 2008. Since then, yields first declined again—reaching new historic lows in 2020 due to fiscal and monetary policy actions taken to mitigate the economic impact of the COVID-19 pandemic—then climbing in 2021 and especially 2022 as policymakers attempt to control inflation. These developments are shown in Figure 3 below.

Figure 3 also displays the consensus forecast from Blue Chip Economic Indicators (BCEI), which surveys more than 50 institutional market analysts and participants, including major banks, academic finance departments, credit rating agencies, institutional investors, and Fortune 500 companies. BCEI projects that the 10-year Treasury yield will peak in 2023 and decrease gradually thereafter.

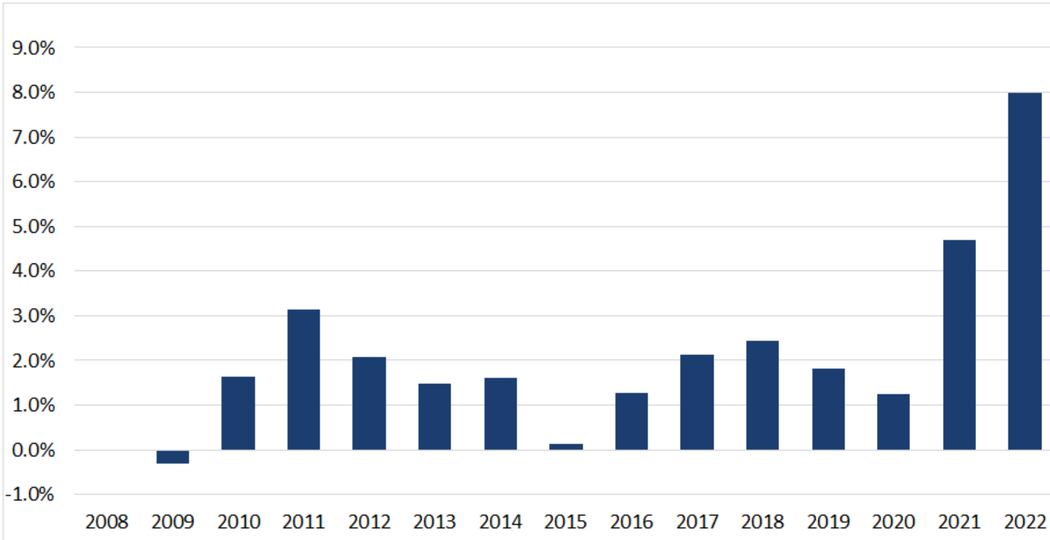
Figure 3
Historical and Forecast Yields
For 10-Year U.S. Treasury Bonds



Q27. What forces have contributed to the rising trend in interest rates since the pandemic lows?

A27. Starting in the latter part of 2021, the U.S. and world economies have experienced rapid inflation, resulting in part from pandemic-related supply chain issues and unprecedented economic stimulus actions by governments and central banks aimed at mitigating the economic impact of the pandemic. The inflation was exacerbated in 2022 by energy price shocks related to Russia's invasion of Ukraine. As shown in Figure 4 below, U.S. CPI growth in 2021-2022 has vastly outstripped the any inflation experienced since prior to the 2008 financial crisis.

Figure 4
Year-over-year Change in U.S Consumer Price Index



Source: U.S. Bureau of Labor Statistics

In response to this rapid and sustained uptick in inflation, the U.S. Federal Reserve implemented a program of steep interest rate hikes, increasing the Federal Funds Rate from 0 to 4.5 percent throughout the course of 2022. As shown in Figure 5 below, he rate increases have continued in 2023 so far, albeit at a slower pace. After the most recent hike announced at the FOMC’s March 21, 2023 meeting, the federal funds target rate stands at 4 ¾ - 5 percent.

Figure 5
Changes in Federal Funds Rate Since 2021

Date	Rate Target	Rate Change
12/15/2021	0 - 0.25%	-
1/26/2022	0 - 0.25%	0
3/16/2022	0.25 - 0.5%	0.25
5/4/2022	0.75 - 1%	0.5
6/15/2022	1.5 - 1.75%	0.75
7/27/2022	2.25 - 2.5%	0.75
9/21/2022	3 - 3.25%	0.75
11/2/2022	3.75 - 4%	0.75
12/14/2022	4.25 - 4.5%	0.5
2/1/2023	4.5 - 4.75%	0.25
3/21/2023	4.75 - 5%	0.25
Year-end Projections		
2023	5.10%	0.20%
2024	4.30%	-0.80%
2025	3.10%	-1.20%

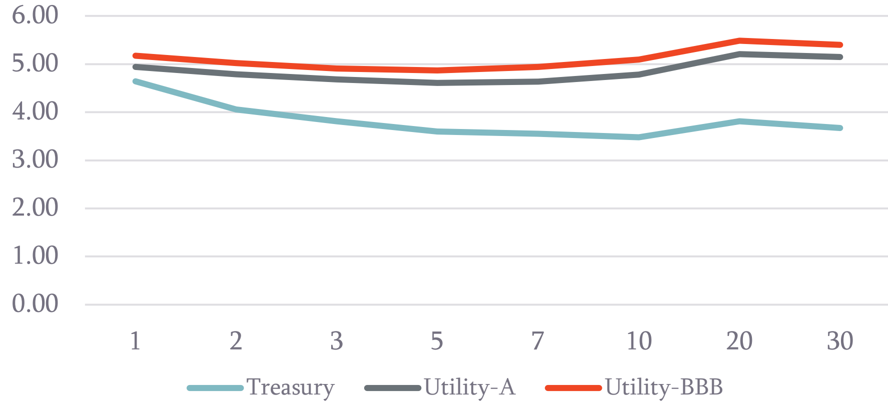
Source: Federal Open Market Committee Press Releases, United States Federal Reserve, accessed at https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm.

Q28. Is it unusual for short-term risk-fee borrowing rates to be lower than the yields on long-term government bonds?

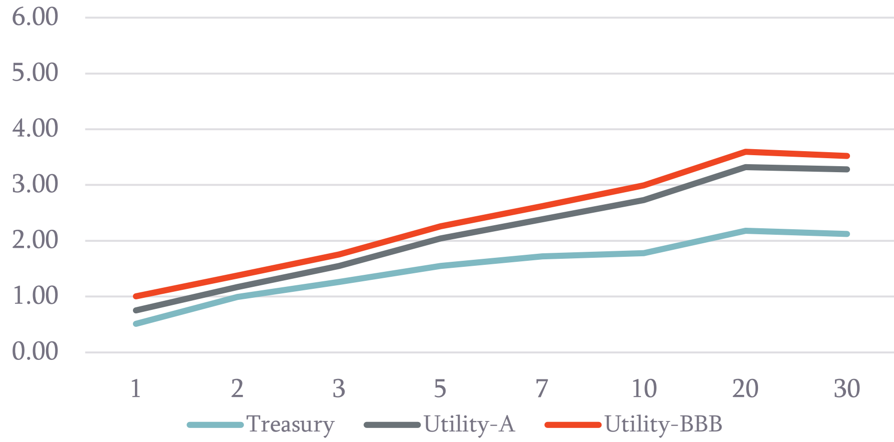
A28. Yes. Typically, there is a "term premium" for longer-term debt relative to short-term borrowing. But, at present, even with overnight lending at the Fed Funds Rate near 5 percent, long-term Treasury bonds are yielding 4 percent or less. When long-term interest rates fall below short-term rates, this is said to represent an "inverted" yield curve.

The current inverted Treasury yield curve is depicted below in Panel A of Figure 6. It shows the downward slope in yield as a function of maturity between the 1-year and 10-year Treasury bond, followed by a slight increase in yield for the 20-year bond. This is contrasted (still in Panel A) with the yield curves for investment grade utility bonds, which are not so dramatically inverted as the Treasury yield curve, but still fairly characterized as "flat". Panels B and C show the same yield curves as of January 2022 and March 2018. In both instances, the expected upward sloping shape was apparent.

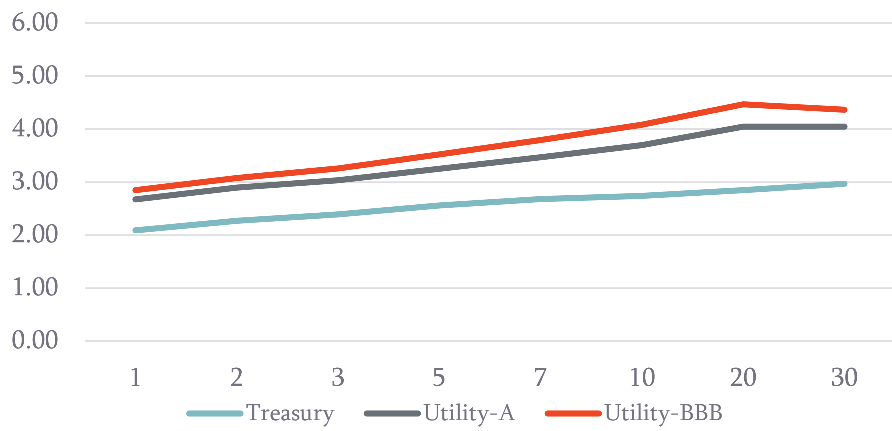
Figure 6
Treasury and Utility Bond Yield Curves
Panel A: Current (March 2023)



Panel B: January 2022



Panel C: March 2018



Source: Bloomberg.

Q29. What are the potential implications of the inverted Treasury yield curve?

A29. The fact that the cost of long-term risk-free borrowing is lower than short-term borrowing rates may indicate a market expectation that inflation will come under control on a relatively near-term horizon. If inflation returns to sustainable levels, then the Federal Reserve can reduce short-term borrowing rates and supply and demand for debt capital at all horizons can reach equilibrium at relatively lower yields. Such an expectation is consistent with the "dot plot" projections of the Federal Open Market Committee (FOMC) members themselves (Figure 5) as well as the BCEI projections of future 10-year Treasury yields (Figure 3).

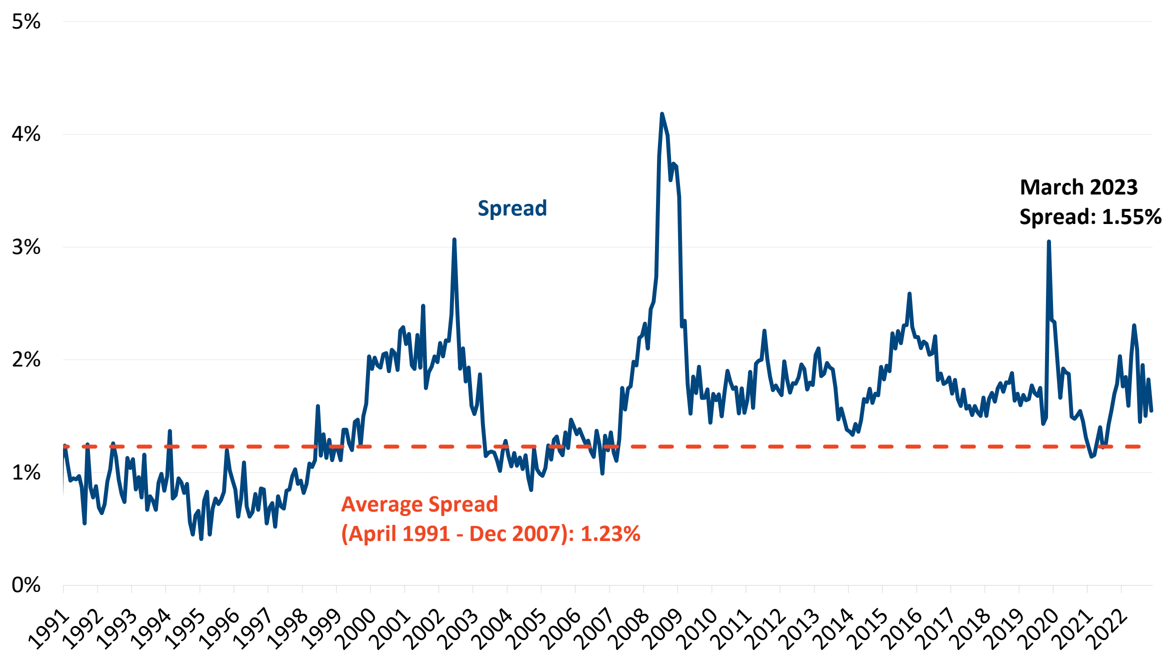
However, if inflation does not continue to slow, then the FOMC may be forced to continue monetary tightening, sparking a substantial recession in which long-term investment, as well as short-term investment are slowed. In that scenario, the yield curve might regain a "normal" upward sloping shape not through a decline in short-term rates, but through a substantial increase in long-term yields.

Q30. What observations do you have regarding the spreads between the yields on corporate bonds versus risk-free government bonds?

A30. Such spreads are observable risk premiums. Unlike U.S. government bonds, debt instruments issued by corporate entities come with some probability of default and have some associated level of systematic risk. To compensate for this risk, corporate bonds—including utility bonds—offer higher expected returns (as measured by the market yield) than do government bonds. As can be seen in Figure 6, even in the current environment there persists a substantial risk premium for investment grade utility bonds compared to Treasury bonds.

Figure 7 plots the level of the yield spread for BBB-rated utility bonds compared to Treasury bonds for the longest period of available data. As the figure shows, utility bond yields spiked dramatically with the onsite of the 2008 financial crisis and again with the onset of the COVID-19 pandemic. The chart also demonstrates that—except briefly in early 2021, corporate yield spreads and have remained elevated relative to their pre-financial crisis average level. Based on available data from 1990 through the end of 2007—including a period of relatively low spreads in the early and mid-1990s and a period of elevated spreads associated with the "dot-com" boom and bust of the late 1990s and early 2000s—the average level of the spread was 1.23 percent. By contrast, on March 31, 2023 (the last trading day before my study date), the spread was more than 20 basis points higher at 1.55 percent and as recently as December 31, 2022, it was more than 70 basis points higher at 1.95 percent.

Figure 7
Yield Spread between BBB Utility Bonds and Treasury Bonds
20-Year Maturity



Q31. What are the implications of elevated yield spreads to the cost of equity?

A31. The yield spread is simply one form of risk premium, albeit for assets (corporate bonds) that are relatively lower risk compared to equity securities (*i.e.*, stock). Academic research suggests that the premium for systematic risk is one factor affecting the level of corporate bond yield spreads.[15] Consequently, one explanation for the elevated yield spread is that investors are requiring a higher premium to take on market risk than they did on average prior to the financial crisis. Since corporate bonds have relatively lower betas compared to the stock market, this explanation would indicate a proportionally higher degree of

[15] "Explaining the Rate Spread on Corporate Bonds," Edwin J. Elton, Martin J. Gruber, Deepak Agarwal, and Christopher Mann, *The Journal of Finance*, February 2001, pp. 247-277.

elevation in the Market Risk Premium for any given degree of elevation in the BBB utility bond spread.[16]

Q32. What is the Market Risk Premium?

A32. In general, a risk premium is the amount of "excess" return—above the risk-free rate of return—that investors require to compensate them for taking on risk. As illustrated above in Figure 1, the riskier the investment, the larger the risk premium investors will require.

The Market Risk Premium (MRP) is the risk premium associated with investing in the market as a whole. Since the so-called "market portfolio" embodies the maximum possible degree of diversification for investors,[17] the Market Risk Premium is a relevant benchmark indicating the level of risk compensation demanded by capital market participants.[18]

Q33. How have forward-looking estimates of the MRP evolved since the onset of the COVID-19 pandemic?

A33. A common way to estimate the MRP is to measure average returns of stocks versus risk-free bonds over a long historical period. However, it is also possible to infer a forward-looking estimate of the MRP based on the prices of stocks in a representative market index in relation to their earnings and projected growth rates. An implied "expected market return" is estimated and compared to a currently prevailing risk-free rate of interest. Bloomberg provides daily updates of such an estimate based on an expected return for the S&P500 stocks compared to a long-term government bond. Figure 8 plots the monthly average values for the period since January 2020.

As shown in the figure, forward-looking MRP estimates have shrunk as Treasury rates have increased, especially since the start of 2022. However, consistent with the discussion

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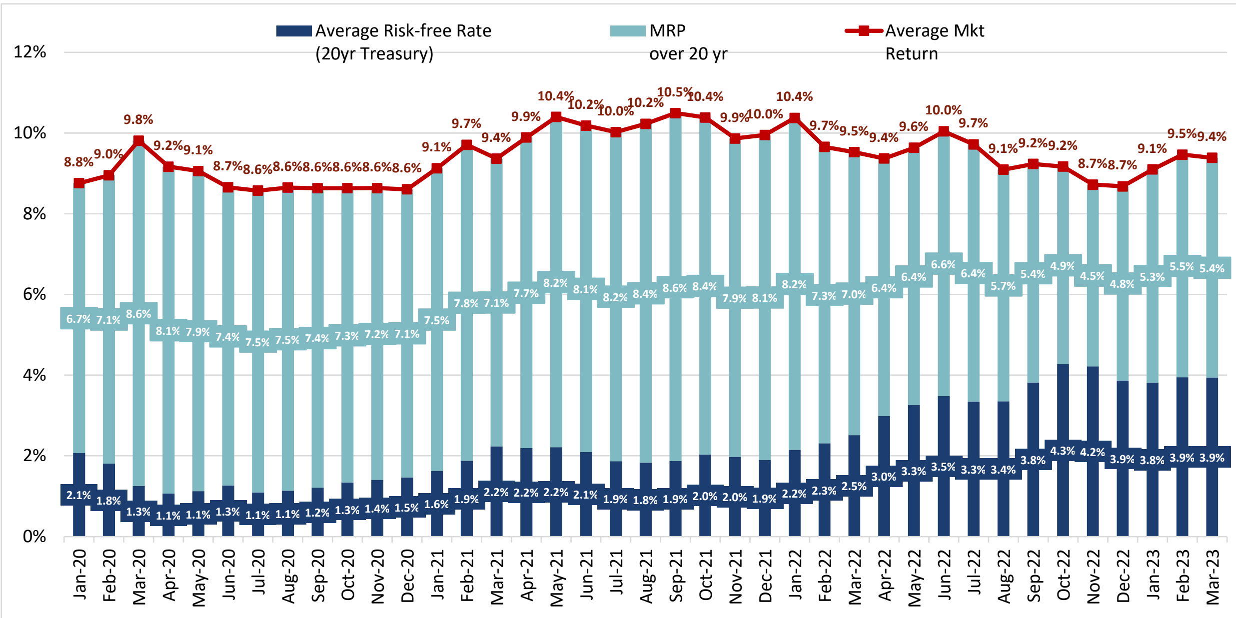
[16] See the technical appendix to this testimony (Attachment MRT-2) for further discussion of how the elevation in the yield spread can be used to infer a benchmark level of elevation in the MRP.

[17] In finance theory, the "market portfolio" describes a value-weighted combination of *all* risky investment assets (including stocks, bonds, real estate, etc…) that can be purchased in markets. In practice, academics and financial analysts nearly always use a broad-based stock market index—such as the S&P 500—to represent the overall market.

[18] Indeed, in risk-positioning models such as the CAPM, the risk premium for an asset is estimated in relation to the Market Risk Premium by "positioning" the asset's systematic risk (as measured by market beta) relative to the risk of the market portfolio (which, by definition, has a beta of 1).

above, the MRP may be expected to widen in the near future if inflation comes under control and capital markets stabilize based on expectations of sustainable inflation going forward.

Figure 8
Bloomberg Expected Market Risk Premium
January 2020 – March 2023



Source: Bloomberg LP, monthly average.

V. ANALYZING THE COST OF EQUITY

A. Sample Selection

Q34. How do you identify and select sample companies?

A34. To select a comparable sample of water utilities, I began with the universe of publicly traded water utilities as classified by Value Line.[19] This resulted in an initial group of 11 companies.

From this group, I selected companies that have five years of data available and an investment grade bond rating. I then investigated their annual reports to ensure they have a high proportion of their assets devoted to regulated water utility operations. In addition, I took steps to ensure that the selected sample companies do not have unique features that

[19] The 11 companies are from *Value Line Investment Analyzer* as of April 7, 2023.

render price data difficult to interpret or otherwise unrepresentative of the business risk associated with regulated utility operations.[20] Those selection criteria result in a core sample of seven companies: American States Water Co. (AWR), American Water Works (AWK), Aqua America Inc., California Water Service Group (CWT), Essential Utilities (WTRG), Middlesex Water Co. (MSEX), and York Water Co. (YORW).

In this case, I also considered two additional companies—Artesian Res. Corp. (ARTNA) and Global Resources Inc. (GWRS)—that do not meet the strict selection criteria due to not having credit ratings from one of the major credit rating agencies. However, these companies have similar business profiles to other small publicly-traded water utilities in the sample, and their financial profiles indicate credit quality consistent with an investment-grade credit rating. Therefore, while I do not include these companies in my core sample, I do perform cost of capital estimates for them and report their contribution to averages for an "expanded sample."

Q35. What are the characteristics of the Water Utility sample?

A35. The Water Utility sample comprises water utilities whose primary source of revenues and majority of assets are subject to regulation. The characteristics of the final sample of seven water utilities (nine in the expanded sample) are displayed in Figure 9 below. These companies own regulated water utilities operating in multiple states. The companies have a very high percentage of their assets devoted to regulated utility operations. Therefore, it is reasonable to consider the Water Utility sample broadly representative of the business risk characteristics of the regulated water distribution industry.

Figure 9 reports the sample companies' annual revenues reported for the year ending December 31, 2022 and their market capitalization as of the end of December 31, 2022. It also shows each company's most recently reported Value Line beta and its 3-5 year EPS growth rate based on current data from Value Line and Thomson Reuters IBES.[21] Finally,

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[20] For example, some companies may trade too infrequently for their stock price to meaningfully convey a market price. Merger and acquisition activity may also affect stock price data.

[21] Thomson Reuters IBES reports "long-term" EPS growth estimates (compound annual growth rates) for a 3–5-year horizon. At the time of my analysis *Value Line Investment Analyzer* reports estimated EPS for fiscal year 2023 and a projection of EPS for "2026-2028," which I use to calculate a CAGR over a the 4-year horizon between 2018 and the "middle year" (2027) of the projection.

the figure reports each company's credit rating and the percentage of each its assets that were associated with regulated operations.

Figure 9
U.S. Water Utility Sample

Company	Annual Revenue (Q1 2023) ($ million)	Regulated Assets	Market Cap. (Q1 2023) ($ million)	Value Line Betas	S&P Credit Rating	Long-Term Growth Estimate
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	$508	R	$3,201	0.70	A+	4.5%
Amer. Water Works	$3,881	R	$25,641	0.90	A	7.4%
California Water	$874	R	$3,147	0.70	A	8.4%
Essential Utilities	$2,294	R	$11,177	0.95	A	6.4%
Middlesex Water	$165	R	$1,343	0.75	A	2.7%
SJW Group	$668	R	$2,324	0.80	A-	7.8%
York Water Co. (The)	$61	R	$632	0.80	A-	4.9%
Core Sample Average	**$1,207**		**$6,781**	**0.80**	**A**	**6.0%**
Artesian Res Corp	$102	R	$506	0.70	n/a	4.0%
Global Water Resources Inc	$46	R	$298	0.80	n/a	15.0%
Expanded Sample Average	**$955**		**$5,363**	**0.79**		**6.8%**

Sources and Notes: Bloomberg, *Value Line*, Thomson Reuters, and Company 10-Ks.

Q36. How does Great Oaks compare to the Water Utility sample companies with respect to the metrics summarized in Figure 9?

A36. Great Oaks is much smaller than any of the companies in the sample. According to its 2021 Annual Report to the CPUC, Great Oaks had annual revenue of approximately $23.3 million,[22] approximately 1/3 the revenue of the smallest company in the core sample (York Water Co.) and a tiny percentage of the sample average ($1.2 billion) and median ($846 million). The average sample company has a credit rating in the A range, while Great Oaks does not issue public debt securities and thus does not have a credit rating. As noted above and discussed further below, owing to its small size, Great Oaks' borrowing cost clearly exceeds the cost of issuing an investment-grade (*e.g.*, A or BBB rated) utility bond. However, the Commission does authorize a Water Cost of Capital Mechanism (WCCM) for Great Oaks which tracked changes in the yields for an index of utility bonds with Moody's Baa ratings,[23] which are analogous to S&P's BBB rating.

[22] Great Oaks' Application, Exhibit A – 2022 Balance Sheet and Income Statement, Schedule B, Line No. 1.

[23] Guster Testimony, pp. 6-7

B. CAPITAL STRUCTURE AND FINANCIAL RISK

Q37. What regulatory capital structure is Great Oaks requesting in its application?

A37. The Company is requesting a regulatory capital structure with 30% debt financing and 70% equity financing. As discussed in the testimony of Company witness Mr. John Roeder,[24] this capital structure is consistent with the capital structure the Commission has deemed for Great Oaks in the past.

Q38. How does this compare to the capital structures of the sample companies?

A38. The sample companies' current capital structures feature debt ratios varying from 16% to 38% of total market value. Over the past 5-years (the period over which betas are estimated) the debt ratios range from 17% to 40%.[25] The regulatory capital structure for Great Oaks therefore contains a generally similar proportion of debt compared to the average capital structure of the publicly-traded sample companies whose stock price information is used in the risk-positioning and DCF models. However, because the individual company capital structures differ from one another, there is different financial risk inherent in an equity investment in Great Oaks' rate base compared to investing in the exchange-traded stock of the individual sample companies. It is important to account for these differences among the sample companies and between the individual sample companies and Great Oaks when estimating the cost of equity.

Q39. How do you account for differences in capital structure when estimating the cost of capital for the sample companies?

A39. There are several standard finance techniques that account for impact of financial risk when measuring the market cost of equity.

One common textbook approach to adjusting for differences in financial leverage was developed by Professor Hamada, who estimated the cost of equity using the CAPM and made comparisons between companies with different capital structures via "unlevering"

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24 Roeder Testimony, pp. 5-6.

25 Attachment MRT-3, Schedule No. MT-4.

and "relevering" adjustments to the market beta.[26] Specifically, in the Hamada approach, the "levered" market beta measured for a sample company—which is influenced by that companies' market value capital structure—is used to calculate what beta would be associated with all-equity financed firm with the same level of business risk. This is the "unlevered beta" or "assets beta," so-called because it measures the sensitivity of the firm's cash flows (generated from its assets) to market movements if there were no debt leverage in the capital structure. The assets beta can then be "re-levered" to determine the equity beta associated with the level of financial risk contained in the target company's regulatory capital structure.[27]

Calculations that unlever and relever betas—which I refer to collectively as "Hamada procedures"—are ubiquitous among finance practitioners when using the CAPM to estimate the cost of equity.

Q40. Do you employ any other techniques to account for differences in financial risk?

A40. Yes. Another technique is to determine the overall (after-tax) weighted-average cost of capital for the sample using the equity and debt percentages as the weight assigned to the cost of equity and debt. This overall cost of capital primarily depends on the business risk of the sample companies, having been adjusted on an apples-to-apples basis for differences in leverage among the companies. Assuming the overall cost of capital is constant between the estimate obtained for the sample and the entity to which it is applied in this case—the capital structure used to set the company's allowed return on rate base—then the allowed ROE that appropriately reflects the financial risk of the regulated entity can be determined. Empirical research indicates that the weighted-average cost of capital is constant for a range that spans the capital structures used to estimate the cost of equity and the regulatory

[26] Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporate Finance," *The Journal of Finance*, 24: 13–31 (March 1969).

[27] For standard textbook treatments, *see* Brealey, Richard A., Myers, Stewart C., and Allen, Franklin, *Principles of Corporate Finance*, 10th Ed. (2011) pp. 482-486; Holthausen, Robert W. and Zmijewski, Mark E., *Corporate Valuation – Theory Evidence and Practice*, 1st Ed. (2014), Chapter 10, pp. 383-419; Ross, Stephen A., Westerfield, Randolph W., and Jaffe, Jeffrey, *Corporate Finance*, 7th Ed. (2005), pp. 328-329 and 490-491.

capital structure.[28] Thus, calculating the overall cost of capital is a way to "unlever" cost of equity estimates measured for sample companies with different capital structures and "re-lever" them at a target capital structure.

I apply this technique (in addition to the Hamada procedure) as a sensitivity in my CAPM-based calculations. I also employ it to account for financial risk differences in the DCF model estimates.[29]

C. CAPM Based Cost of Equity Estimates

1. The CAPM and Empirical CAPM

Q41. Please briefly explain the CAPM.

A41. In the CAPM the collective investment decisions of investors in capital markets will result in equilibrium prices for all risky assets such that the returns investors expect to receive on their investments are commensurate with the risk of those assets relative to the market as a whole. The CAPM posits a risk-return relationship known as the Security Market Line (see Figure 1), in which the required expected return on an asset is proportional to that asset's relative risk as measured by that asset's so-called "beta."

More precisely, the CAPM states that the cost of capital for an investment, i (e.g., a particular common stock), is given by the following equation.

$$r_i = r_f + \beta_i \times MRP \qquad (1)$$

where r_i is the cost of capital for investment i;

r_f is the risk-free interest rate;

β_i is the beta risk measure for the investment i; and

MRP is the market risk premium.

The CAPM is a "risk-positioning model" that relies on the fact that investors price risky securities to offer a higher expected rate of return than safe securities. It is also a "single parameter model" in that it says differences in the cost of capital among different securities

28 *See* Jonathan Berk & Peter DeMarzo, *Corporate Finance*, 3rd Edition, 2014, p. 490 and Brealey, Richard A., Myers, Stewart C., and Allen, Franklin, *Principles of Corporate Finance*, 10th Ed. (2011) p. 486.

29 Since the Hamada technique unlevers and relevers betas, it cannot be directly applied to the DCF model.

depend only on differences in their systematic market risk as measured by a single factor: beta.

The CAPM predicts that an investment whose returns do not vary relative to market returns should (i.e., an asset with $\beta_i = 0$) receive the risk-free interest rate, whereas the market receives the risk-free rate plus the Market Risk Premium. Further, it says that the risk premium of a security over the risk-free rate equals the product of the beta of that security and the Market Risk Premium.

Importantly, the market as a whole—which is a value weighted portfolio of all risky investments—has average risk ($\beta_m = 1$) by definition. An asset with less than average risk ($\beta < 1$) is one whose value varies proportionately less for a given variation in overall market value. Conversely, an asset with greater than average risk ($\beta > 1$) varies proportionately more for a given market movement.

Q42. Did you use any other risk positioning model?

A42. Yes. Empirical research has shown that the Empirical Capital Asset Pricing Model ("ECAPM") tends to perform better than the traditional CAPM, reflecting the observed tendency of low-beta stocks to have higher risk premiums than predicted by the CAPM and high-beta stocks to have lower risk premiums than predicted.[30] A number of variations on the original CAPM theory have been proposed to explain this finding, but the observation itself can also be used to estimate the cost of capital directly, using beta to measure relative risk by making a direct empirical adjustment to the CAPM.

The variation on the CAPM that I employed makes use of these empirical findings, and is thus referred to as the ECAPM. It estimates the cost of capital with the equation,

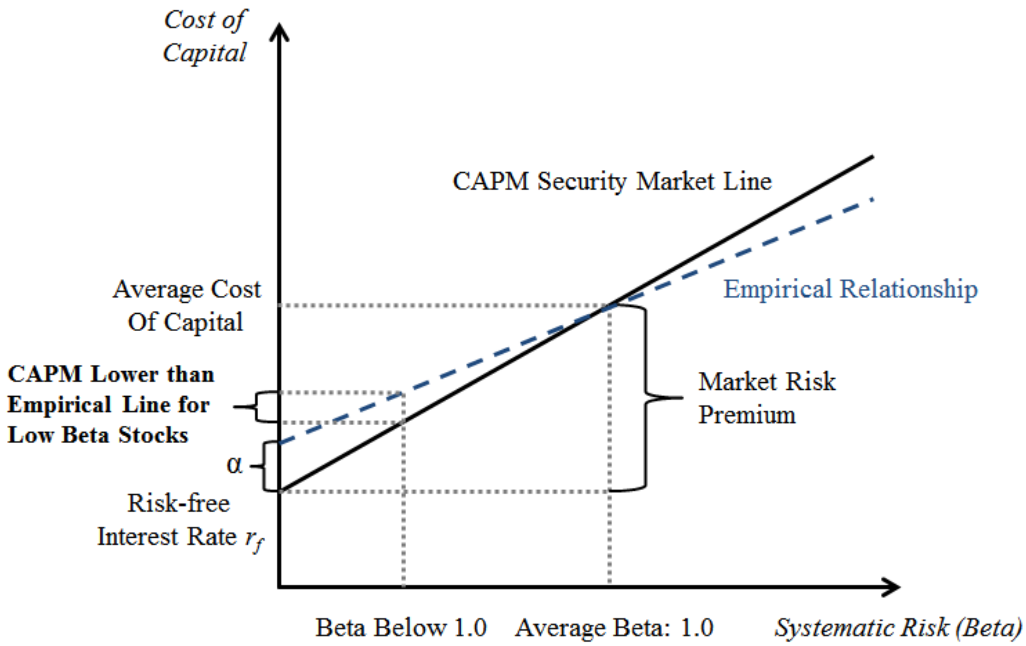
$$r_i = r_f + \alpha + \beta_i \times (MRP - \alpha) \quad (2)$$

where $\boldsymbol{\alpha}$ is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM (see Equation (1) above).

30 *See* Attachment MRT-2 for references to relevant academic articles.

The alpha parameter has the effect of increasing the intercept but reducing the slope of the Security Market Line (as shown in Figure 10), which produces a Security Market Line better matching the results empirical tests. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

Figure 10
The Empirical Security Market Line



Q43. How do you implement the ECAPM?

A43. The ECAPM is based on recognizing that the actual observed risk-return line is flatter and has a higher intercept than that predicted by the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact, which has been established by repeated empirical tests of the CAPM. Figure A-2 in the technical appendix to this testimony (Attachment MRT-2) provides a list of empirical studies that have tested the CAPM and also documents their findings regarding the magnitude of alpha. As discussed in the appendix, I rely on an alpha value of 1.5 percent in implementing the ECAPM.

2. Inputs to the CAPM

Q44. What inputs does your implementation of the CAPM and ECAPM require?

A44. As demonstrated by Equations (1) and (2), implementing the CAPM and ECAPM for my sample companies requires a measure of the risk-free rate of interest and the Market Risk Premium, as well as a measurement of each company's beta. I performed multiple CAPM calculations corresponding to distinct scenarios reflecting different values of the inputs. This allows me to derive a range of estimates for the cost of equity capital.

Q45. What security do you use to represent the risk-free asset?

A45. I used the yield on a 20-year U.S. Treasury bond as the risk-free asset for purposes of my analysis. U.S. Treasury bonds are backed by the full faith and credit of the U.S. government and are widely considered to be free of any default risk. I rely on a long-term bond (rather than short-term bills) when estimating the cost of equity for utilities because equity has a perpetual life (*i.e.*, it never expires) and investors typically hold utility stocks over long horizons. I specifically rely on a bond with a 20-year maturity to match the average tenor of bonds used to measure the long-term historical average market risk premium, noting that there was a period of time during which 20-year bonds were the longest maturity issued by the U.S. Treasury.

Q46. What specific value do you use for the risk-free interest rate?

A46. Recognizing the fact that the cost of capital set in this proceeding will be in place from July 1, 2024 through June 30, 2027, I rely on a forecast of what Government bond yields will be during that period. Specifically, Blue Chip Economic Indicators predicts that the yield on a 10-year Government Bond will be 3.4 percent in 2024, 3.3 percent in 2025, and 3.2 percent in 2026 and beyond.[31] I therefore take the midpoint (2025) forecast of 3.3 percent and adjust this value upward by 50 basis points, which is my estimate of the representative maturity premium for the 20-year over the 10-year Government Bond. This gives me a projected risk-free rate of 3.8 percent.

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[31] Blue Chip Economic Indicators, March 2023.

I also considered a scenario in which the risk-free rate reflects current yields on long-term government bonds. Specifically, the 20-year Treasury bond yield averaged approximately 3.9 percent in February and March 2023.[32]

Q47. What values did you use for the Market Risk Premium?

A47. Like the cost of capital itself, the Market Risk Premium is a forward-looking concept. It is by definition the premium above the risk-free interest rate that investors can expect to earn by investing in a value-weighted portfolio of all risky investments in the market. The premium is not directly observable and must be estimated based on known market information.

One commonly used method for estimating the Market Risk Premium is to measure the historical average premium of market returns over the income returns on government bonds over the longest historical period where data is available. Kroll (formerly known as Duff & Phelps) performs such a calculation of the Market Risk Premium using for the nearly 100-year historical period for which high quality historical stock and bond return data is available. The average market risk premium from 1926 to 2022 is 7.2 percent.[33]

The market risk premium can vary over time, reflecting the investment alternatives and aggregate level of risk aversion present in markets. As discussed in Section IV, Bloomberg calculates a forward-looking MRP estimate based on market prices and expected dividend growth for the constituents of the S&P 500. Based on average values calculated in February and March of 2023, Bloomberg currently shows an expected market return of 9.4 - 9.5 percent, for an MRP of 5.4 - 5.5 percent relative to current 20-year Treasury bond yields.

The fact that Bloomberg infers a lower risk premium at present may be a result of lower expectations for U.S. economic growth in response to the Fed's aggressive monetary

[32] This is quite similar to the risk-free rate derived by applying a historical average maturity premium to a projected future 10-year Treasury yield, since (as discussed above in Section IV) the Treasury yield curve is currently inverted on the short end and flatter than usual on the long end. At present, 20-year Treasury bond yields only exceed 10-year yields by approximately 20 basis points, rather than the 50 basis points historical average. In the projected scenario, I believe it is reasonable to expect the yield curve to normalize over the 2024-2026 period, such that the historically typical maturity premium will re-emerge.

[33] Kroll Cost of Capital Navigator, 2023.

policy, coupled with some recovery in stock prices (thereby depressing dividend yields) after the pronounced market downturn in 2022. However, Section IV also presents evidence pointing in the other direction. Specifically, continued elevation of bond yield spreads relative to the time before the 2008 global financial crisis suggests that the MRP should be above—rather than below—its long-term historical average.[34] Nevertheless, I consider a scenario using 5.5 percent for the Market Risk Premium, based on the recent Bloomberg forward-looking estimates.

Q48. What betas did you use for the companies in your sample?

A48. I considered beta estimates provided by both *Value Line* and Bloomberg. The estimates from both providers used five years of weekly return data and employed the standard Blume adjustment. The only methodological difference I am aware of between the two providers is the choice of market index against which to measure variability in stock returns. Bloomberg uses the S&P 500 index, while *Value Line* uses all stocks listed on the New York Stock Exchange (NYSE).[35] As shown in Figure 11 below, the two sets of beta estimates align quite closely for the companies in the Water Utility sample. My CAPM results reported below and in my Attachment MRT-3 rely on the Value Line betas.

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34 Attachment MRT-2 (Technical Appendix), Section II describes the relationship between elevated yield spread and the MRP.

35 *Value Line* also rounds its beta estimates to the nearest 0.05, while Bloomberg reports its estimated betas to an arbitrary number of decimal places.

Figure 11
Value Line and Bloomberg Betas
For the Water Utility Sample

Company	ValueLine [1]	Bloomberg [2]
Amer. States Water	0.70	0.63
Amer. Water Works	0.90	0.94
California Water	0.70	0.67
Essential Utilities	0.95	0.91
Middlesex Water	0.75	0.77
SJW Group	0.80	0.79
York Water Co. (The)	0.80	0.83
Core Sample Average	0.80	0.79
Artesian Res Corp	0.70	0.64
Global Water Resources Inc	0.80	0.81
Expanded Sample Average	0.79	0.78

Source: Attachment MRT-3, Workpaper #2 to Schedule No. MT-10

Q49. Can you illustrate the effect of adjusting these betas for differences in financial leverage compared to Great Oaks' capital structure?

A49. Yes. Figure 12 illustrates the effect of the adjustment based on the 5-year average capital structures of the sample companies. As the table shows, sample companies with equity ratios greater than 70 percent have their betas increased when applied at Great Oaks' capital structure, whereas companies with lower equity ratios have their betas reduced. Overall, because the average equity ratio for the sample companies is very similar to Great Oak's regulatory capital structure, the average relevered beta is similar to the average levered beta as measured directly by Value Line.

Figure 12
Comparison of Value Line's Measured Equity Betas for the Sample Companies
To Betas Re-levered at 70% Equity

Company		Levered Equity Beta [1]	5-year Average Equity (%) [2]	Unlevered Assets Beta [3]	Re-levered @ 70% Equity [4]
Amer. States Water	[a]	0.70	82.5%	0.61	0.79
Amer. Water Works	[b]	0.90	68.5%	0.69	0.89
California Water	[c]	0.70	71.6%	0.56	0.71
Essential Utilities	[d]	0.95	66.1%	0.71	0.91
Middlesex Water	[e]	0.75	80.4%	0.65	0.83
SJW Group	[f]	0.80	59.5%	0.55	0.71
York Water Co. (The)	[g]	0.80	81.6%	0.70	0.89
Artesian Res Corp	[h]	0.70	68.5%	0.54	0.69
Global Water Resources Inc	[i]	0.80	70.1%	0.62	0.80
Sample Average	**[j]**	**0.80**	**71.5%**	**0.63**	**0.81**

Sources and Notes:
Attachment MRT-3, Schedule No. MT-13 and Workpaper #1 to Schedule No. MT-14.

3. CAPM and ECAPM Cost of Equity Estimates

Q50. Please summarize the input parameters of the scenarios you considered in your CAPM and ECAPM estimates.

A50. The input parameters for the two scenarios are displayed in Figure 13 below, Scenario 1 uses a projected risk-free rate for the 2024-2027 period and uses a Market Risk Premium consistent with the long-term historical average, while Scenario 2 reflects currently prevailing long-term government bond yields and Bloomberg's current forward-looking estimate of the Market Risk Premium.

Figure 13
Parameters Used in CAPM-based Models

	Scenario 1	**Scenario 2**
Risk-Free Interest Rate	3.80%	3.90%
Market Risk Premium	7.20%	5.50%

Q51. Please summarize the results from the risk-positioning models.

A51. Figure 14 below summarizes the Water Utility sample CAPM and ECAPM results for the two input scenarios.[36] I place somewhat more weight on the ECAPM results in recognition of the established tendency of the traditional CAPM to understate the cost of equity for lower-than-average risk companies such as the Water Utility sample companies. Based on these results, I conclude that the risk-positioning models support a reasonable range of 8 ½ to 10 percent for the cost of equity of the average water sample company[37] when applied to a 70% equity capital structure.

Figure 14
Risk Positioning Cost of Equity Results

	Scenario 1	Scenario 2
	[1]	[2]
Core Water Sample		
CAPM	9.6% - 9.7%	8.3% - 8.3%
ECAPM (α = 1.5%)	9.9% - 10.0%	8.6% - 8.7%
Full Sample		
CAPM	9.5% - 9.5%	8.2% - 8.2%
ECAPM (α = 1.5%)	9.8% - 9.8%	8.5% - 8.6%

Sources / Notes:

Ranges encompass estimates from Financial Risk Adjusted method and Hamada Adjustment with and without taxes.

[1]: Long-term Risk-free Rate of 3.80%, Long-term Market Risk Premium of 7.20%.

[2]: Long-term Risk-free Rate of 3.90%, Long-term Market Risk Premium of 5.50%.

[36] The ranges in Figure 14 summarize the sensitivity for the various specific formulas used to account for financial risk (*i.e.*, Equations A-2, A-5, and A-6, in Attachment MRT-2). For example, the average ECAPM results for the Core Sample in Scenario 1 are approximately 10.0 percent using the Hamada technique to unlever and relever beta, while the result applying the overall cost of capital method is 10.2 percent.

[37] As discussed in Section VI below, Great Oaks' has characteristics that make it riskier than the average sample company, which warrants placement of its allowed ROE in the upper end of the range of reasonable estimates derived from applying financial models to the Water Sample companies.

D. DCF BASED COST OF EQUITY ESTIMATES

1. Single- and Multi-Stage DCF Models

Q52. Please describe the DCF approach to estimating the cost of equity.

A52. The DCF model attempts to estimate the cost of capital for a given company directly, rather than based on its risk relative to the market as the CAPM does. The DCF method simply assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula, which calculates the sum of a stream of expected "cash flows" discounted at a risk-appropriate discount rate. When the cash flows are dividends, that discount rate is the cost of equity capital:

$$P_0 = \frac{D_1}{1+r_E} + \frac{D_2}{(1+r_E)^2} + \frac{D_3}{(1+r_E)^3} + \cdots + \frac{D_T}{(1+r_E)^T} \quad (3)$$

Where P_0 is the current market price of the stock;

D_t is the dividend cash flow expected at the end of period t;

T is the last period in which a dividend cash flow is to be received; and

r_E is the cost of equity capital.

Importantly, this formula implies that if the current market price and the pattern of expected dividends are known, it is possible to "solve for" the discount rate, r_E that makes the equation true. In this sense, a DCF analysis can be used to estimate the cost of equity capital implied by the market price of a stock and market expectations for its future dividends.

Many DCF applications assume constant growth, so that the formula can be rearranged algebraically to estimate the cost of capital. Specifically, the implied DCF cost of equity can then be calculated using the well-known "DCF formula" for the cost of capital:

$$r_E = \frac{D_1}{P_0} + g = \frac{D_0}{P_0} \times (1+g) + g \quad (4)$$

where D_0 is the current dividend, which investors expect to increase at rate g by the end of the next period, and over all subsequent periods into perpetuity.

Equation (4) says that if the core assumptions of the general DCF model (Equation (3)) hold and dividends are expected to grow at a constant rate, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the single-stage DCF model.

Q53. Are there alternative versions of the DCF model?

A53. Yes. There are many alternative versions, notably (i) multi-stage models, (ii) models that use cash flow rather than dividends, or versions that combine aspects of (i) and (ii).[38] One such alternative expands the Gordon Growth model to three stages. In the multi-stage model, earnings and dividends can grow at different rates, but must grow at the same rate in the final, constant growth rate period.[39]

A common implementation of the multi-stage DCF is to assume that companies grow their dividend for five years at the forecasted company-specific rate of earnings growth, with the growth rate then transitioning to over the next five years toward a forecast of the growth rate of the overall economy (*i.e.*, the long-term GDP growth rate forecasted to be in effect ten years or more into the future).

2. DCF Inputs

Q54. What inputs are necessary to implement the DCF model?

A54. The model requires information on the sample companies' market prices and dividends paid (which can be expressed in combination as a dividend yield), as well as forecasts for the rate of dividends growth.

To estimate dividend yields, I used the most recently available dividend information and the average of the last 15 days of stock prices as of my study date. The single largest advantage of the DCF model is that it can reflect the most "current" market information available, I use a relatively short recent time period to determine the dividend yield. Yet to

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38 The Surface Transportation Board uses a cash flow based model with three stages. See, for example, Surface Transportation Board Decision, "STB Ex Parte No. 664 (Sub-No. 1)," Decided January 23, 2009. Confirmed in STB Docket EP No. 664 (Sub-No. 2), October 31, 2016.

39 *See* Attachment MRT-2 for further discussion of the various versions of the DCF model, as well as the details of the specific versions I implement in this proceeding.

avoid potential bias caused by using a single day's closing price, I take a multi-day average. I believe a 15-day average accomplishes this goal.

Q55. Are there any potential issues with using the available dividend yield data in the DCF models?

A55. Yes. As noted above, the core underlying principle of the DCF model is that market prices reflect investors' expectations of the future *cash flows* they will receive. Some companies in the Water Utility sample engage in share buybacks, which is another way of distributing cash to shareholders *in addition* to issuing periodic dividends.

The presence of incremental cash distributions means that the dividend yield underestimates the yield on cash distributions. If the dividend yield does not reflect all sources of cash available to investors—as is the case for several of the sample companies—then the DCF model will underestimate the cost of equity. I have not performed any quantitative adjustment for the impact of share buybacks in my calculations. In this regard I believe my estimates are conservatively low.

Q56. What growth rate information did you use?

A56. I looked to a sample of investment analysts' forecasted earnings growth rates for companies in my samples. I used investment analyst forecasts of company-specific growth rates sourced from *Value Line* and/or IBES.[40]

The multi-stage DCF model additionally requires a measure of the long-term expected GDP growth. For this purpose, I employ Blue Chip Economic Indicators' forecast of nominal GDP growth for the period 2030 forward, which is 3.9 percent. I note, however, that the current GDP growth forecast is substantially below the level of nominal GDP growth that historically been observed.

[40] I calculate an average long-term growth rate for each sample company based on the data from both sources. In cases where estimates are not provided by one source or the other, I used only the available source. See Attachment MRT-3, Schedule No. MT-5.

3. DCF Cost of Equity Estimates

Q57. What are the DCF estimates for the sample?

A57. Sample average single-stage and multi-stage DCF estimates of the cost of equity are presented in Figure 15 below. Because the company specific 3 to 5 year growth rate forecasts are higher than the forecast future growth rate for GDP that is assumed to prevail into perpetuity as the terminal growth rate in the third and final stage of the multistage model, the multistage DCF results are substantially lower than the single-stage model estimate. This accounts for the wide range of the results.

Figure 15
DCF Cost of Equity Results

	Simple	Multi-stage
Core Water Sample	8.7%	6.5%
Full Sample	9.8%	6.5%

Q58. Do you have any concerns about the multi-stage DCF result?

A58. Yes. I consider the multi-stage DCF result to be an outlier, and not representative of the cost of capital for water utilities at this time. I believe there are three reasons for this. First, notwithstanding the stock market correction of 2022, market prices for the Water Sample companies remain high relative to historic valuations, leading to relatively lower dividend yields. (This affects both the single-stage and multi-stage estimates.) Second, the forecasted future GDP growth rate is quite low relative to historical levels of GDP growth, which tends to decrease the projected cash flows after the first stage of the model.

Third, and most importantly, the water utility industry is in a period of high and accelerating capital expenditures associated with replacement of aging infrastructure in compensation for historic underinvestment.[41] Consequently, capital investment budgets of the Water Utility sample companies have grown substantially, averaging double-digit annual growth over the last decade with no plans to stop or even substantially slow this

[41] S&P Global Market Intelligence, "RRA Water Advisory Current Trends & Growth Drivers," July 19, 2021 and "RRA Water Advisory Current Trends & Growth Drivers," July 18, 2022.

pace.[42] Based on these market trends and other factors favoring expanded investment in water infrastructure by investor-owned utilities, growth in the Water Sample is likely to be sustained or accelerated going forward.[43]

Since water utilities are extremely capital intensive—with ratios of capital expenditure to cash flows that are typically higher than even those of electric and natural gas utilities[44]—the acceleration of capital expenditure increases the growth potential (and risk) for the industry's cash flows. Consequently, it more likely that the earnings of the sample companies will grow faster than the economy for a sustained period—as assumed by the single-stage DCF model—rather than revert relatively quickly to the rate of growth of the overall economy as in the multi-stage version

Q59. Are there any other reasons to dismiss the multi-stage DCF results as an outlier?

A59. Yes. After adjusting the results for the sample companies to apply at Great Oaks' 70 percent equity capital structure, the average result is 6.5 percent, which is only 80 bps higher than the currently prevailing yield on 20-year BBB rated utility bond.[45] I do not find it credible that an investor would take on the added risk of an equity investment in Great Oaks when they could purchase the less risky bond of a larger utility that issues investment grade bonds for only slightly lower expected return. Accordingly, I do not find the multi-stage DCF results reliable as an indicator of the cost of equity for Great Oaks or any other water utility in the current economic environment.

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[42] S&P Global Market Intelligence, "RRA Water Advisory Current Trends & Growth Drivers," July 18, 2022; *see also* S&P Global Market Intelligence, "Utility capital expenditures update – H1 2023: 2012-2027F," March 14, 2023.

[43] S&P Global Market Intelligence, "RRA Water Advisory - Consolidation of Municipal Systems Accelerates with use of Fair Market Valuation," September 29, 2020.

[44] S&P Global Market Intelligence, "Utility capital expenditures update – H1 2023: 2012-2027F," March 14, 2023.

[45] *See* Attachment MRT-3, Workpaper #2 to Schedule No. MT-11. As a further indication that the 6.5 percent multi-stage DCF result is not a credible estimate of the current cost of equity for Great Oaks, I note that 6.5 percent is the interest rate on Great Oaks' long-term debt.

Q60. What do you conclude from the DCF results?

A60. For the reasons explained immediately above, I place primary emphasis on the average single-stage DCF result, which is 8.7 percent based on the Core Sample and 9.8 percent for the Expanded Sample, suggesting a reasonable range of 8 ¾ to 9 ¾ percent for the cost of equity of a water utility (with business risk similar to the average sample company[46]) if applied at 70 percent equity capital structure.

E. THE IMPLIED RISK PREMIUM MODEL ESTIMATES

Q61. Did you estimate the cost of equity that results from an analysis of risk premiums implied by ROE's that were derived in past utility rate cases?

A61. Yes. In this type of analysis, which I am calling the "Implied Risk Premium" to avoid potential confusion with a broader set of approaches that are often categorized under the label of "risk premium" approaches, the cost of equity capital for utilities is estimated based on the historical relationship between ROEs derived in in past utility rate cases and the risk-free rate of interest at the time the ROEs were derived. This calculation adds a risk premium implied by this relationship to the relevant (prevailing or forecast) risk-free interest rate:

$$Cost\ of\ Equity = r_f + Risk\ Premium$$

Q62. What are the merits of this approach?

A62. First, it estimates the cost of equity from regulated entities as opposed to publicly-traded holding companies, so that the relied upon figure is directly applicable to the allowed return on the equity portion of a regulated utility's rate base. Second, the allowed returns are clearly observable to market participants, who will use this one data input to make investment decisions, so that the information is at the very least a good check on whether the return is comparable to that of other investments. Third, I analyze the spread between the allowed ROE at a given time and the then-prevailing interest rate to ensure that I properly consider the interest rate regime at the time the ROE was awarded. This

[46] As discussed in Section VI below, Great Oaks has characteristics that make it riskier than the average sample company, which warrants placement of its allowed ROE in the upper end of the range of reasonable estimates derived from applying financial models to the Water Sample companies.

implementation ensures that I can compare allowed ROE granted at different times and under different interest rate regimes.

Q63. How did you use rate case data to estimate the risk premiums for your analysis?

A63. I used water utility rate case data compiled by S&P Global Market Intelligence for the years 2010 through 2022.[47] Using this data I compared (statistically) the average allowed rate of return on equity granted by U.S. state regulatory agencies in water utility rate cases to the average 20-year Treasury bond yield that prevailed in each year.[48]

I calculated the allowed utility "risk premium" in each year as the difference between authorized returns and the Treasury bond yield, since this represents the compensation for risk allowed by regulators. Then, I used the statistical technique of ordinary least squares (OLS) regression to estimate the relationship between the treasury bond yield and the risk premium. The result of this estimation technique is shown below:

$$Risk\ Premium\ =\ 8.82\%\ -\ 0.692\ \times\ (Treausury\ Bond\ Yield) \quad (5)$$

The negative slope coefficient reflects the empirical fact that regulators grant smaller risk premiums when risk-free interest rates (as measured by Treasury bond yields) are higher. This is consistent with past observations that the premium investors require to hold equity over government bonds increases as government bond yields decline. Additionally, I find that these parameters have a high explanatory power (in a statistical sense) over variability in allowed risk premiums.[49]

In the regression relationship described by Equation (5), the risk premium declines by less than the increase in Treasury bond yields. In other words, the allowed ROE on average declined by less than 100 basis points when the government bond yield declined by 100 basis points.

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47 S&P Global Market Intelligence, "Water utility rate case data, Jan. 1, 2010 – Dec. 31, 2022," as of February 13, 2023.

48 I rely on the 20-year government bond to be consistent with my CAPM analysis. While it is important to use a long-term risk-free rate to match the long-lived nature of the assets, the exact maturity is a matter of choice.

49 An indicator of "goodness of fit" is the R^2 value associated with the regression. For this regression, the R^2 value is 0.95. With no variation in data (i.e. a perfect fit) the R^2 value would equal 1.

Q64. What are the results of your Implied Risk Premium analysis?

A64. Based on this analysis, I find that the risk premium results applied using current treasury yields are consistent with a ROE of 10.0 percent for the average water utility.[50]

Q65. What conclusions do you draw from this analysis?

A65. While risk premium models based on historical allowed returns are not underpinned by finance theory and market data in the manner of the CAPM or DCF models, I believe this analysis can provide useful benchmarks for evaluating whether the estimated ROE is consistent with recent practice. My implied risk premium model cost of equity estimates demonstrate that my DCF and risk-positioning model results are broadly in line with the actions of utility regulators. Because my Implied Risk Premium analysis takes into account the average interest rate prevailing during the period in which the decisions were issued, it provides a useful benchmark for the cost of equity in any interest environment.

VI. COST OF CAPITAL RECOMMENDATION FOR GREAT OAKS WATER

A. BUSINESS RISK CHARACTERISTICS OF GREAT OAKS WATER

Q66. What are the risk characteristics for Great Oaks compared to the sample companies you examine?

A66. Great Oaks is the smallest of the California Class A water companies. With approximately 21,400 service connections in a single urban area (San Jose), it is far smaller and far more geographically concentrated than any of the companies in the Water Utility sample. Great Oaks also serves a relatively high proportion (approximately 92%) of residential customers for an urban water distributor. This is relevant because water conservation restrictions often induce proportionately larger usage reductions by residential users compared to

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50 *See* Attachment MRT-4. The 10.0 percent result is consistent with the both the projected risk free rate of 3.80 percent (Scenario 1) and the current 20-year Treasury bond yield of 3.90 percent (Scenario 2).

commercial and governmental users. Great Oaks is thus especially vulnerable to lost revenue due to lower-than-forecast water use.[51]

Great Oaks relies on 22 groundwater wells for its sole source of supply and is therefore exposed to supply risk if the water quality or levels in these wells is in any way threatened. As noted in Mr. Roeder's testimony, the CPUC has in the past recognized that primary or sole reliance on ground water supply increases risk for a water utility.

In these aspects, Great Oaks' small size sets it apart from the Water Utility sample companies and contributes to it having somewhat higher business risk compared to those companies. Also, as noted above, Great Oaks' annual revenue and asset value are commensurately low relative to those the publicly traded sample companies.

Q67. How is Great Oaks' small size relevant in context of the cost of capital?

A67. Great Oaks' small size imposes added risks that are not experienced by larger utilities such as those in the Water Sample. The small scale of the Company's operations contribute to a much tighter operating profit margin than any of the other California Class A utilities, with annual revenue requirement equal to approximately 130 percent of rate base.[52] When the ratio of a company's revenues to its fixed operating costs is relatively low, it is said to display high *operating leverage*, which corresponds to greater percentage variability in the cash flows available to investors, thereby increasing the risk of the investment. Intuitively, high financial leverage also implies lower financial flexibility to respond to unexpected events and less opportunity to take advantage of economies of scale.

In addition, empirical research shows that the stock returns for the smallest publicly-traded companies reflect risk premiums substantially in excess of those predicted by the CAPM

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[51] *See* Roeder Testimony, pp. 8-11. As Mr. Roeder explains, Great Oaks recovers only 75 percent of its fixed costs through a fixed service charge, with the remainder being recovered from volumetric charges. Additionally, as discussed below, Great Oaks does not have full revenue decoupling through a WRAM and drought condition conservation memorandum accounts are reduced before they can be recovered. Consequently, this rate design structure place Great Oaks at risk of greater revenue variability, especially when usage variances are asymmetrically weighted toward reductions.

[52] *See* D.23-04-004 Decision Authorizing Great Oaks' General Rate Increases for 2022-2024, at 68 ($18.2 million adopted rate base for 2023/2024) and 85 ($23.8 million adopted total revenue requirement for 2023/2024).

based on their systematic risk.[53] In other words, small firms earn risk premiums above what would be expected based on their measured market betas. While I have not included an explicit "size premium" in my cost of equity estimates for Great Oaks, in my opinion the Company's small size and associated increased operating leverage warrants an allowed ROE above the mid-point of the range of reasonable cost of equity estimates.

Q68. Does Great Oaks benefit from any regulatory mechanisms designed to reduce the variability of its revenues or reduce regulatory lag?

A68. Yes, but probably to a substantially lesser degree than the sample companies. Like the other California Class A water companies, Great Oaks has a "Monterey style" Water Revenue Adjustment Mechanism (WRAM), which adjusts for differences in revenue collection from tiered rates compared to a single block rate.

However, Great Oaks does not have a full WRAM to decouple its revenues from variations in volume of water served.[54] During droughts, revenue reductions due to conservation are recorded in a memorandum account, but this account is reduced before it can be collected.[55] Additionally, Great Oaks is fully at risk for revenue loss from reduced water consumption outside of a drought condition.

Similarly, Great Oaks does not have access to a Distribution System Improvement Charge (DSIC) or any similar mechanism allowing recovery of necessary capital expenditures outside the context of a general rate case. Such mechanisms reduce regulatory lag and have become increasingly common in water utility regulation. DSIC mechanisms are in place in at least 17 states, including many jurisdictions where the Water Utility sample companies have regulated distribution operations.[56] Thus, unlike many of the sample companies'

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[53] *See, e.g.*, "Size as a Predictor of Equity Returns," Kroll Cost of Capital Navigator.

[54] Great Oaks has never had such a mechanism. However, the future of full WRAM decoupling mechanisms for CPUC regulated water companies generally is uncertain. The CPUC has issued a decision removing future authorizations for such mechanisms and that decision is now before the California Supreme Court on appeal.

[55] *See*, Water Standard Practice U-40-W Drought Procedures, Section I, pp. 12-13.

[56] NRRI Report No. 18-01, "Water Distribution System Improvement Charges: A Review of Practices," January 2018. The 17 states with DSIC programs encompass the entire service territories of Middlesex Water (NJ and DE) and The York Water Company (PA) and include seven out of the eight states where Aqua America operates. American Water has operations in all 17 states mentioned in the NRRI report.

regulated subsidiaries, Great Oaks cannot earn a return on any necessary but unanticipated capital investments made between rate cases until it can apply to add them to rate base in the next general rate case.

For these reasons, I consider Great Oaks to face a somewhat higher degree of regulatory risk than the average sample company. Regulatory risk is a key component of business risk for a regulated utility company such as Great Oaks.

Q69. Are there any other relevant considerations related to regulatory risk for Great Oaks?

A69. Yes. It is my understanding that the Commission and the state of California intend to implement permanent mandatory water budgets and new water loss standards as part of a the laws and regulations to "Make Conservation a Way of Life," which California water utilities such as Great Oaks will have to enforce on customers and which the State will enforce against Great Oaks. To the extent these conservation measures succeed, Great Oaks' customers will use less water, meaning that increases in water distribution rates will be necessary to recover the fixed cost elements of Great Oaks' revenue requirement. I also understand that the Commission constrains water utility rates based on affordability standards, about which there is significant uncertainty as to the proper implementation.[57]

These competing pressures create risk with respect to the recoverability of Great Oaks' future investments in maintaining and improving its water distribution system. For example, I understand new regulations concern water losses will require Great Oaks to reduce water losses by 38 percent by 2028.[58] Such a mandate could impose significant incremental operating expenses and capital expenditures associated with inspection and repair of pipes and other facilities. If Great Oaks cannot be assured that it will be able to implement the necessary rate increase to cover these costs – while delivering steadily less water each year in conformance with conservation budgets – it faces risk of not having the opportunity to recover its allowed return.

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[57] *See* D.22-08-023, Decision Implementing the Affordability Metrics.

[58] The 38% reduction is from the average water loss for CY2017 – CY2020, to be measured by the average water loss for CY2025 – CY2027.

B. RECOMMENDED ALLOWED ROE

Q70. Please summarize your ROE evidence.

A70. Based on my application of standard cost of capital models to a representative sample of publicly-traded water utility companies—with appropriate consideration of financial—I derive the range of cost of equity estimates displayed in Figure 16 below.

Figure 16: Range of Reasonable Cost of Equity Estimates

Model / Analysis	Reasonable Range
CAPM	8 ½ - 10 percent
DCF	8 ¾ - 9 ¾ percent
Implied Risk Premium	10 percent
Overall	**8 ¾ - 10 percent**

Compared to the similar analysis I conducted for Great Oaks' 2018 cost of capital application, the CAPM and DCF ranges in my current analysis are somewhat wider. Based on my assessment of the merits of the various models and their results, I find that an ROE in the range of 8 ¾ - 10 percent is reasonable for the water distribution utilities when applied to Great Oaks' requested regulatory capital structure of 70% equity and 30% debt, which is consistent with Great Oaks actual capital structure as well as the deemed capital structure determined and adopted by the CPUC in Great Oaks' most recently approved Cost of Capital Decisions.[59]

Q71. What do you recommend for Great Oaks' allowed return on equity?

A71. I recommend that Great Oaks be allowed an ROE of 9.7 percent, which is the midpoint of the upper half of the 8 ¾ - 10 percent recommended range that I derived as described above. Given Great Oaks' small size and higher than average regulatory risk, I consider this to be a reasonable placement within the range.

[59] D.13-05-027 and D.18-12-004 (Cost of Capital) and D.19-09-010 and D.23-04-004 (General Rate Case).

I note that this point estimate is somewhat lower than the 9.79 percent ROE I recommended for Great Oaks in 2018, which is reflective of the somewhat lower CAPM and DCF model estimates at present compared to the time of my 2018 testimony, which are driven by the relatively lower growth expectations reflected in current capital markets as compared to five years ago. However, as discussed in Section IV above, these conditions are affected by significant uncertainty in the economy coupled with persistent high inflation and the Federal Reserve's response to same.

C. DEBT COST RATE FOR IMPUTED DEBT

Q72. Is Great Oaks requesting that a certain level of debt be imputed in its regulatory capital structure as part of this proceeding?

A72. Yes. It is my understanding that, in order for Great Oaks to achieve the deemed 70% equity / 30% debt regulatory capital structure that the CPUC has consistently approved as the start of the effective period for this proceeding, approximately $5.5 million of debt must be added to Great Oaks existing $4.0 million of long-term debt. Otherwise, the mix of equity and debt on the Company's balance sheet will result in a capital structure featuring greater than 80% equity financing. [60]

Q73. What cost of debt is the Company requesting be applied to the imputed debt?

A73. I understand the company is requesting an imputed debt cost rate of 7.5 percent, which is the same rate that was accepted by the Commission in previous instances where it was determined that debt should be imputed in Great Oaks' capital structure.[61]

Q74. In your opinion, is 7.5 percent a reasonable cost rate for Great Oaks' imputed debt in this proceeding?

A74. Yes. In terms of achieving the target 70% equity / 30% debt regulatory capital structure that the Commission has consistently deemed appropriate for Great Oaks, the imputation of $5.5 million of additional debt would complement the Company's $4.0 million of

[60] Roeder Testimony, pp. 5-6.

[61] *Id*.

existing debt, which consists of a long-term note that was issued in 2014 and is set to expire in 2028.[62] Therefore, it is reasonable to think of the required imputed debt as long-term borrowing with a maturity at least long enough to match the 2028 expiry of Great Oaks' existing long-term note. Accordingly, the cost rate applied to that imputed debt should reflect Great Oaks' current cost of borrowing over a long-term horizon of 5 years or longer. As discussed below, based on current capital market evidence and CPUC precedent, 7.5 percent appears to be a reasonable reflection of long-term borrowing cost for Great Oaks.

Q75. Is this consistent with how the Commission determined to approve the 7.5 percent cost rate for Great Oaks imputed debt in the past?

A75. Yes. In my understanding, the Commission first approved an imputation of debt in Great Oaks capital structure in Decision 10-12-057. In doing so, the Commission recognized that the applicable cost of debt should be long-term in nature and should consider the impact of projected issuances during the relevant period.[63] The CPUC noted that 7.5 percent was consistent with the long-term borrowing costs then experienced by the other Class A utilities and identified that it represented a premium above the market yields observed for the Moody's Baa Corporate Bond index,[64] which is make up of long-term corporate bonds.

Q76. Is it appropriate for Great Oaks' imputed cost of debt to be set at a premium over Baa corporate bond yields?

A76. Yes. As discussed above, owing to its small size and the small scale of its financing needs, Great Oaks cannot raise debt financing on the public securities markets. Further, given the small scale of the Company's operations and the attendance high operating leverage and financial and business risk, it is reasonable to expect that any third party financing Great Oaks could obtain would embed a substantial premium above the borrowing costs that large corporate entities with investment grade credit ratings can obtain by issuing exchange traded bonds. Accordingly, embedding a premium above the Baa Moody's Corporate Bond

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[62] D.14-09-006, Decision Authorizing Great Oaks' Issuance of $4 Million in Debt (September 16, 2014) at 4.

[63] D.10-12-057 at 22.

[64] *Id.* at 22-23.

Index yield is appropriate now, just as it was in 2010 and 2013[65] when the Commission previously approved the 7.5 percent cost rate for Great Oaks' imputed debt.

Q77. Have you analyzed the premium above the Moody's Baa Bond Index that has been realized over the time periods in which Great Oaks' rates incorporated the 7.5 percent Commission-approved cost of imputed debt?

A77. Yes. The results are shown in Figure 17 below. As the table indicates, current yields on Baa rated long-term corporate bonds are similar to when the Commission initially approved and applied the 7.5 percent cost of imputed debt in D.10-12-057, and higher than when the same rate was re-approved in D.13-05-027. Setting Great Oaks cost of imputed debt at 7.5 percent in this proceeding would represent an approximately 190 basis point premium above current Baa corporate bond yields, which is—in my opinion—a reasonable estimate of Great Oaks' higher borrowing cost, and is generally consistent the CPUC's past determinations on this issue.

Figure 17
Great Oaks Imputed Debt Cost
Historical and Proposed Spreads to Baa Corporate Bond Index Yields

Period Start	Period End	Applicable CPUC Decision	Great Oaks Imputed Debt Cost	Moody's Baa Index	Spread to Moody's Baa
Jan 1, 2010	**Dec 31, 2010**	**D.10-12-057**	**7.5%**	**6.0%**	**1.5%**
Jan 1, 2011	Dec 31, 2011	D.10-12-058	7.5%	5.7%	1.8%
Jan 1, 2012	Dec 31, 2012	D.10-12-059	7.5%	4.9%	2.6%
Jan 1, 2013	Jun 30, 2013	D.10-12-060	7.5%	4.8%	2.7%
Jul 1, 2013	**Jun 30, 2014**	**D.13-05-027**	**7.5%**	**5.2%**	**2.3%**
Jul 1, 2014	Jun 30, 2015	D.13-05-027	7.5%	4.7%	2.8%
Jul 1, 2015	Jun 30, 2016	D.13-05-027	7.5%	5.2%	2.3%
Jul 1, 2016	Jun 30, 2017	D.13-05-027	7.5%	4.5%	3.0%
Jul 1, 2017	Jun 30, 2018	D.13-05-027	7.5%	4.5%	3.0%
Jul 1, 2018	Jun 30, 2019	D.13-05-027	7.5%	4.9%	2.6%
Jul 1, 2022	**Mar 31, 2023**	**Current Proposal**	**7.5%**	**5.6%**	**1.9%**

Source: Moody's Seasoned Baa Corporate Bond Yield (BAA) | FRED | St. Louis Fed (stlouisfed.org)

65 D.13-05-027.

D. WATER COST OF CAPITAL MECHANISM (WCCM)

Q78. Have you compared current capital market compared to the time of the 2018 Cost of Capital proceeding in the context of the Water Cost of Capital Mechanism?

A78. Yes. The WCCM operates to formulaically update the cost of capital based on changes in corporate bond rates. Specifically, if the annual average yield on the Moody's Baa Corporate Bond index changes by more than 100 bps relative to a benchmark period, the cost of equity is adjusted by 50 percent of the change in bond yields and a new benchmark period is established. As discussed in Mr. Guster's testimony, the WCCM was suspended for all Class A water companies as part of the March 2020 agreements to postpone their next Cost of Capital filings.[66] However, I note that as shown above in Figure 17, the average Moody's Baa Corporate Bond index yield is currently noticeably higher than it was during the July 1, 2018 – June 30, 2019 benchmark period from Great Oaks' prior cost of capital proceeding.

Q79. Does this conclude your testimony?

A79. Yes.

[66] Guster Testimony, pp. 7-9.

Michael R. Tolleth

PRINCIPAL

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Mr. Tolleth specializes in the economic analysis of energy markets, with expertise in financial modeling and valuation of energy assets, contracts, and businesses.

He supports clients in litigation and arbitration matters and provides expert testimony on issues of cost of service, rate design, cost of capital, regulatory policy, long-run marginal cost pricing, and market power in the utility and midstream oil and gas sectors.

Mr. Tolleth has extensive experience analyzing business risk and estimating the cost of capital for regulated companies in the utilities, pipeline, and railroad industries, as well as for valuation and marginal cost pricing applications. He has testified on utility finance and ratemaking matters before the California Public Utilities Commission (CPUC), the Regulatory Commission of Alaska (RCA), the Alberta Utilities Commission (AUC), and the British Columbia Utilities Commission (BCUC), and has contributed to expert reports on financing costs in unregulated infrastructure industries, including electric generation and Liquid Natural Gas (LNG) production and distribution.

Mr. Tolleth has also advised clients and testified on pipeline rate regulation matters before the Federal Energy Regulatory Commission (FERC), the Canada Energy Regulator (CER), and the CPUC, and has testified on pipeline contract valuation before the Alberta Court of King's Bench.

AREAS OF EXPERTISE

- Regulatory Economics, Finance & Rates
- Oil & Gas
- Electricity Litigation & Regulatory Disputes
- M&A Litigation

EDUCATION

- **The University of Chicago Booth School of Business**
  MBA (high honors), concentrations in economics, finance, and statistics
- **University of California, San Diego**
  BS (magna cum laude) in Chemical Physics

PROFESSIONAL EXPERIENCE

- **The Brattle Group (2013–Present)**
  Principal (2022–Present)
  Senior Associate (2017–2021)
  Associate (2013–2017)

EXPERT TESTIMONY

- ***Generic Cost of Capital*** | Alberta Utilities Commission | Proceeding 27084

  Written direct evidence (February 2023) and written reply evidence (April 2023) on behalf of Apex Utilities Inc.

- ***TotalEnergies EP Canada Ltd. vs. Suncor Energy Operating Inc. et. al.*** | Court of King's Bench of Alberta (January 2023)

  Rebuttal expert report on behalf of Suncor and cross examination.

- ***Applications of Crimson California Pipeline L.P. (PLC-26) for Authority to Increase Crude Oil Transportation Rates and to Establish a Surcharge for Regulatory Compliance Costs***

  California Public Utilities Commission | Application Nos. A.22-03-013 and A.22-07-017
  Prepared answering testimony (November 2022) and supplemental answering testimony (April 2023) on behalf Phillips 66 Company.

- ***Doyon Utilities, LLC Tariff Revisions for 2020 Test Year Rates*** | Regulatory Commission of Alaska | Docket Nos. U-21-075 (July 2022)

  Prepared written reply testimony on behalf of Doyon Utilities, LLC.

- ***NOVA Gas Transmission Ltd. Application for Firm Transportation – Linked North Montney Service*** | Canada Energy Regulator | RH-001-2021 (October 2021)
  Provided written evidence, with Paul R. Carpenter, on behalf of PETRONAS Energy Canada Ltd.

- ***Application of SFPP, L.P. (PLC-9) for Authority to Increase Rates for Transportation of Refined Petroleum Products*** | California Public Utilities Commission | Application No. A.21-01-015 (October 2021)

  Prepared answering testimony on behalf of Chevron Products Company, Phillips 66 Company, Southwest Airlines Co., and Valero Marketing and Supply Company.

- ***Enbridge Pipelines Inc. Canadian Mainline Contracting Application*** | Canada Energy Regulator | *RH-001-2020* (December 2020 and June 2021)

  With Paul R. Carpenter and Daniel S. Arthur, provided written evidence (December 2020) and live testimony at the evidentiary hearing (June 2021), on behalf of Suncor Energy, Inc.

- ***Epsilon Trading, LLC v. Colonial Pipeline Company*** | Federal Energy Regulatory Commission | Docket Nos. OR18-7-002 *et al.* (2019–2020)

  Direct testimony (September 2019), rebuttal testimony (April 2020), and live testimony at the evidentiary hearing (October 2020) on behalf of Epsilon Trading, LLC, Chevron Products Company, Valero Marketing and Supply Company, BP Products North America, Inc., Trafigura Trading, LLC, TCPU Inc., Southwest Airlines Co, United Aviation Fuels Corporation, Phillips 66 Company, American Airlines, Inc., and Metroplex Energy, Inc.

- ***Great Oaks Water Company Cost of Capital Application***| California Public Utilities Commission | Application No. A.18-05-001 (May and August 2018)

  Direct and rebuttal testimony on behalf of Great Oaks Water Company.

- ***Revisions to Indexing Policies and Page 700 of FERC Form No. 6*** | Federal Energy Regulatory Commission | Docket No. RM17-1-000 (January 2017)

  Sworn affidavit on behalf of Airlines for America, the National Propane Gas Association, and Valero Marketing and Supply Company,

- ***Petition for Rulemaking*** | Federal Energy Regulatory Commission | Docket No. RM15-19-000 (September 2015)

  Sworn affidavit on behalf of Airlines for America, the National Propane Gas Association, and Valero Marketing and Supply Company.

SELECTED CONSULTING EXPERIENCE

COST OF CAPITAL AND UTILITY REGULATORY FINANCE

- **Test period ratemaking treatment of tax rate change for Alaska utility**
  In a utility rate setting proceeding before the Regulatory Commission of Alaska (RCA), provided testimony on matters of regulatory process and policy concerning the incorporation of reduced federal tax rates in utility rates. Explained the economic rationale and implications of issues including prospectivity, regulatory lag, and holistic review of overall cost structure in the context of the RCA's test period ratemaking regime.

- **Cost of capital for US state-jurisdictional regulated utility companies**
  In support of cost of capital testimony in many state-jurisdictional gas, electric, and water rate cases, estimated the required return on equity capital for regulated utility services. Have testified on utility cost of capital before the California Public Utilities Commission, and supported expert witnesses on cost of capital and utility finance issues before state regulatory commissions in Alaska, California, Illinois, Michigan, New York, Ohio, Pennsylvania, and West Virginia. As part of this work, have implemented single- and multi-stage versions of the DCF model and standard and empirical versions of the Capital Asset Pricing Model (CAPM) in accordance with finance theory. Examined issues related to proxy group selection criteria, proper application of adjusted betas in the empirical CAPM, estimates of the market risk premium (MRP), and use of the overall cost of capital and Hamada methods to account for financial risk. Also analyzed historical allowed and realized ROE data to benchmark the cost of capital, including preparation of implied risk premium model estimates. Analyzed the potential impact on relative risk of electric distribution vs. generation assets, as well as various regulatory provisions such as revenue decoupling, capital expenditure trackers, and retail choice.

- **Generic cost of capital for Canadian utility companies**
  In a series of generic cost of capital proceedings before the Alberta Utilities Commission (AUC), supported Brattle witnesses testifying on the appropriate allowed ROE and deemed capital structures for a group of electric and gas distribution and transmission companies operating under AUC regulation. Assisted with the development and application of proxy group selection criteria and the calculation of CAPM and DCF-based cost of equity estimates for multiple representative sample groups, including evaluating the statistical robustness and predictive power of historical equity beta estimates derived using monthly and weekly return data over various estimation windows. Also analyzed credit rating agency methodologies and performed pro forma credit metric calculations to assess the impact of cost of capital parameters on utility company liquidity and debt coverage measures.

  Have also been retained as an expert consultant and witness in generic cost of capital proceedings before the British Columbia Utilities Commission (BCUC), submitting an expert report evaluating the BCUC's "benchmark utility" approach to setting fair rate of return parameters for the many small utilities under its jurisdiction. Also consulted for gas and district energy distribution utilities in British Columbia regarding business risk and its relationship to the cost of capital in the context of the regulatory cost of capital proceedings.

- **Analysis of regulatory tax treatment for Canadian utility companies**
  In the context of a generic cost of capital proceeding before the AUC, analyzed the impact of applying either the normalized Future Income Tax (FIT) methodology or the flow-through methodology for recovery of income tax costs in the revenue requirement. Developed a comparative model for representative utility assets and investment patterns to analyze differences in cost recovery trajectories as well as associated effects on utility cash flows and the present value of the revenue requirement. Also analyzed and illustrated the implications of switching between the normalized and flow-through methodologies for partially-depreciated utility assets, including handling of over or under-funded deferred tax balances.

- **Deferred capital cost recovery for a regulated power plant**
  In a proceeding before the Regulatory Commission of Alaska (RCA), assisted in developing a proposal for deferred recovery of capital costs associated with a newly built combined-cycle natural gas power plant, whose addition to the electric utility's rate base would otherwise result in a sudden and substantial rate increase. Worked with Brattle consultants to establish a deferred recovery pattern and integrate it into the utility's revenue requirement. Also performed research to establish the economic rationale and identify regulatory precedents for designing regulated utility rates on a "level nominal," "level real," or "trended original cost" basis to better approximate competitive pricing patterns and help mitigate "rate shock" when investment occurs infrequently in large, discrete increments.

- **Rate of return for interstate natural gas pipelines**
  On behalf of several natural gas pipeline companies, assisted with the development of rate of return testimony before FERC. In addition to performing DCF estimates of the required return on equity (ROE) in accordance with FERC precedent, analyzed growth rate estimates provided by securities analysts and aggregated by Thomson Reuters' IBES, documenting the variability in the estimates over time and developing potential modifications to improve consistency and statistical robustness in ROE estimates over time. Also conducted research and analysis on development of natural gas pipeline proxy groups in light of the small number of companies meeting FERC's traditional criteria.

- **Rate of return for interstate electric transmission investments**
  Advised a number of clients on the expected allowed rate of return on equity (ROE) for FERC-jurisdictional electric transmission assets. Assisted in the development of Brattle's cost of equity models to incorporate changes to FERC's required estimation methodology, including its rulings concerning the implementation of the Discounted Cash Flow (DCF) model and other models. Quantified the impact of the changes in FERC

precedent on base and incentive rates for investments by both independent transmission companies and members of Regional Transmission Organizations (RTOs).

- **Cost of capital methodology for US Class I railroads**
  For a proceeding before the Surface Transportation Board (STB), performed research and analysis pertaining to the Board's implementations of the Multistage Discounted Cash Flow (MSDCF) model and Capital Asset Pricing Model for determining the cost of equity capital for the railroad industry. The central analysis addressed certain critiques of the MSDCF, including assumptions about the evolution of cash flows and the impact of share repurchases on growth rate inputs. Designed a flexible spreadsheet model that replicated the methodology under a series of modified specifications; this model was used to examine the effects of the critiques on the implementation and results of the model.

- **Cost of equity for Australian coal rail network**
  In support of an Australian coal rail network operator's open access application before the Queensland Competition Authority (QCA), coauthored a report on parameters relevant to estimating the appropriate weighted average cost of capital (WACC), including the market risk premium, risk-free interest rate, and derived unlevered (assets) beta. In addition to analyzing the statistical properties of historical equity beta estimates derived using monthly and weekly return data over various estimation windows, evaluated relevant criteria of business risk comparability for the regulated rail network access business in accordance with QCA precedent and developed samples of comparator companies – including a North American pipelines proxy group – to inform beta estimation.

- **Benchmarking of utility earnings**
  On behalf of three electric distribution utilities, implemented a statistical analysis of realized returns on total capital for asset-intensive industries to establish benchmarks for Ohio's significantly excessive earnings test (SEET). The analysis supported testimony before the Public Utility Commission of Ohio.

OIL AND NATURAL GAS PIPELINE ECONOMIC REGULATION

- **Valuation of Pipeline Transportation Contracts**
  In context of a civil dispute related to Suncor's buy-out of a joint venture partner's interest in the Fort Hills Mine oil sands project, led a Brattle team to value the seller's firm pipeline transportation capacity reservation contracts. Performed analysis of tariff rates and contract terms and applied appropriate differential discount rates to variable transportation margin and take-or-pay fixed contract payment cash flow streams with different risk profiles. Also projected relevant locational commodity price differentials based on commodity price netbacks for marginal transportation costs under several plausible scenarios concerning the balance of crude oil production and takeaway

capacity in the Western Canada Sedimentary Basin (WCSB). Prepared a rebuttal expert report and was cross-examined before the Court of King's Bench of Alberta.

- **Pipeline transportation service for LNG supply**
  Led a Brattle team in evaluating the tariff provisions and tolls associated with a proposed natural gas access tariff arrangement for point-to-point transportation of gas from production fields to an LNG export facility. The team analyzed the proposed negotiated toll levels and contract revenues concerning the associated incremental expansion costs and calculated the net revenue contribution from the new service in relation to the allocated cost of service for the relevant existing system assets, according to the pipeline's cost allocation and tolling methodology. Submitted written evidence to the Canada Energy Regulator (CER) that evaluated this net revenue contribution in the context of the relevant economic principles and regulatory precedents regarding the reasonableness of cost-reflective negotiated pipeline tolls.

- **Contract carriage conversion for major crude oil pipeline**
  In litigation before the CER, provided expert testimony regarding Enbridge Pipeline Inc.'s proposal to convert its Canadian Mainline from common carriage to contract carriage service, with implications for the transportation of most of the crude oil produced in the Western Canada Sedimentary Basin (WCSB). Led a Brattle team in evaluating the proposed contract tolls relative to projected costs of providing transportation and in consideration of the associated balance of risk between the pipeline and its shippers. Coauthored written evidence and testified at a hearing on topics related to the substantial divergence of the proposed tolls from cost-based levels, including as affected by the cross-jurisdictional nature of the contracts and the potential for Enbridge to exercise market power as the dominant provider of ex-WCSB crude oil transportation capacity. The CER relied expensively on the Brattle evidence in support of its decision to deny Enbridge's Mainline Contracting application.

- **Tariff mechanism for recovery of product loss cost**
  In a FERC rate proceeding involving a major petroleum products pipeline, provided expert testimony regarding an appropriate mechanism for recovering costs arising from loss of value occurring due to the interface of unlike petroleum products in the course of batched pipeline transportation. Presented evidence that the pipeline's administration of a Product Loss Allowance (PLA) fee was incompatible with FERC precedent and test period ratemaking principles for oil pipelines, and proposed a replacement mechanism that was compliant with regulatory principles, standard

industry practice, and economic incentives for cost efficiency. Recommendations were endorsed and adopted in the presiding judge's initial decision.

- **Petroleum products pipeline cost of service and ratemaking**
  In numerous FERC and CPUC rate proceedings concerning crude oil and petroleum products pipelines, performed cost of service and rate design analysis, including determination of appropriate levels of throughput, operating expenses, and rate base.
  - In FERC matters, performed analysis to evaluate the question of substantially changed circumstances in the economic basis of the existing pipeline rates.
  - Before the CPUC, provided testimony on test period ratemaking principles and regulatory precedent to determine whether a memorandum account or surcharge treatment are warranted with respect the tracking and recovery of capital costs for particular categories of system improvement projects.
  - Analyzed cost of capital issues, including determination of capital structure and cost of debt, as well as principles for establishing a proxy group and study period for calculating a allowed return on equity in consideration of relevant regulatory precedent.

  Other cost of service issues addressed and analyzed include (1) allocation of corporate overhead, (2) appropriate treatment and allocation of deferred costs such as accumulated deferred income taxes (ADIT), deferred earnings, and dismantlement, removal, and restoration (DR&R) costs, (3) accounting for non-transportation revenues arising from shared use of carrier assets, and (4) provision of income tax allowances to Master Limited Partnership (MLP) pipelines.

- **Determination and implementation of rate index for oil pipelines**
  In rulemaking proceedings before FERC, made expert recommendations regarding the methodology for determining the level of the "index differential" used to set FERC's annual rate index for oil pipelines. Directed Brattle consultants in analyzing decades worth of cost and operational data for 200+ FERC jurisdictional pipelines to estimate the historical industry-wide cost change as a benchmark for the index. As part of the analysis, developed a research process and dynamic spreadsheet tool for extracting and reviewing selected numerical and descriptive information from the FERC Form No. 6: Annual Report of Oil Pipeline Companies (Form 6).

  Have also performed analysis and submitted expert recommendations regarding the appropriate standard for FERC to apply in evaluating shipper challenges to index-based rate changes, in keeping with the economic principles underlying effective incentive-based ratemaking regimes.

- **Crude oil pipeline market-based rates**
  In support of expert testimony concerning the FERC market-based rates applications of several crude oil pipelines, estimated the pipeline's long-run marginal cost (LRMC) to act as a proxy for the rates that would be expected to prevail in a workably competitive market. The LRMC analyses relied on recent expansion and green-field pipeline development projects in the relevant markets. Relied on information from tariff filings, annual FERC financial regulatory reports, committed shipper contracts, and pipeline

company authorization for expenditure (AFE) documents to estimate the per-barrel incremental capital and operating costs associated with these projects, and used these costs to develop a reasonable range for LRMC of pipeline transportation capacity in the relevant markets.

- **Petroleum products pipeline market based rates**
  In support of testimony concerning the existing or applied-for FERC market-based ratemaking authority of several petroleum products pipelines, estimated the pipelines' long-run marginal cost (LRMC) to act as a proxy for the rates that would be expected to prevail in a workably competitive market. The analysis relied on forecasts of demand growth and capital and operating costs to determine the economical sequence and timing for the deployment of expansion options.

- **Issues of regulatory tax treatment for partnership pipelines**
  In policy and rulemaking proceedings before the FERC, presented evidence regarding the double recovery of investor income tax costs when an income tax allowance (ITA) is included in the cost of service for pipelines owned by tax pass-through entities such as MLPs. Developed and explained models of the revenue requirement and investors' earned returns on book and market equity to demonstrate that because the pre-investor tax allowed ROE fully compensates MLP unit holders for their income tax costs, provision of an ITA at the pipeline entity level leads to double recovery of those costs. Also analyzed the impact of FERC ceasing to grant ITAs to MLP-owned pipelines on regulatory treatment of accumulated deferred income taxes (ADIT).

- **Oil pipeline reporting requirements**
  In two related FERC oil pipeline rulemaking proceedings, filed affidavits in support of a petition to require pipeline companies to file cost of service information on a disaggregated basis when they operate distinct systems or segments. Performed research and analysis of quantitative and qualitative information presented in FERC Form No. 6 and tariff filings to determine which FERC-jurisdictional pipeline systems provide indications that they operate separate systems for crude oil vs. petroleum product transportation and/or geographically or operationally distinct segments within those systems.

- **Supply chain operations modeling for pipeline jurisdictional analysis**
  In the jurisdictional determination phase of a FERC petroleum product pipeline proceeding, analyzed product stocks and flows at various nodes of an intermodal supply chain moving jet fuel from out-of-state sources via marine vessel, through tankage at a marine terminal, and through the pipeline to its airport destination. To assess whether the average observed supply levels were consistent with continuous interstate movement from the origin to the airport (versus separate marine and pipeline movements on either side of a distribution hub), constructed a hypothetical model of a continuous intermodal supply chain serving daily jet fuel demand via larger and less frequent marine deliveries. By modeling uncertainty in the timing and size of deliveries,

provided a benchmark pattern of fluctuating supply levels against which to gauge the observed inventory and flows.

- **Revenue modeling for pipeline services**
  On behalf of a shipper on a natural gas pipeline, assisted with the development of a model to forecast revenues and realized return on equity for the pipeline under its proposed new service offering. Using information from the pipeline's application to the Canadian National Energy Board (NEB) and public data about its operating history, constructed scenarios for contracted capacity and tolling volumes under various service tiers, as well as discretionary pricing of non-firm capacity. The revenue scenarios and sensitivities helped the client assess the new service offering relative to both the status quo and the pipeline's costs.

- **Damages calculations for pipeline cost of service**
  Regarding multiple pipeline rate proceedings before the California Public Utility Commission (CPUC) and FERC, developed and maintained spreadsheet models designed to compute damages for a group of shippers on a petroleum products pipeline. The analysis involved tracking a number of cost-of-service issues, including ITA and ADIT, rate base development, operating expense adjustments, and rate indexing related to dozens of separate but interrelated dockets. Compared prevailing collected vs. estimated just and reasonable rates, assigned damages for eligible shipment volumes, and computed interest owed on refunds. Also analyzed and prioritized the contributions of various cost of service issues to the estimated FAC rates. The models and analyses in this case were used to dynamically generate flexible reports on damages broken down by proceeding and issue that informed the litigation and settlement negotiation strategies of the client shippers.

- **Analysis of pipeline discretionary pricing**
  In a contested rate proceeding before the National Energy Board (NEB), assisted in the development of testimony supporting TransCanada Pipeline Company's discretionary pricing of short-term and interruptible services. Analyzed gas flows and physical trading at hubs served by TransCanada's Mainline to evaluate whether gas supply was concentrated enough to be susceptible to economic withholding by any one supplier. The competitive analysis covered both primary (e.g., interconnecting pipelines) and secondary (e.g., firm capacity contract holders) market alternatives to TransCanada's short-term services. Also assisted with statistical analysis to evaluate a claim that spikes in hub prices during the "polar vortex" winter of 2013–2014 were causally dependent on TransCanada's discretionary pricing.

OIL AND NATURAL GAS VAULATION AND MARKET ANALYSIS

- **Analyzing the financial circumstances of a midstream MLP merger**
  In a Delaware Chancery Court investor class action suit, analyzed the circumstances and impacts of a merger between two midstream oil and gas companies that were organized as Master Limited Partnerships (MLPs) and were controlled by the same General Partner (GP). Performed financial analyses to demonstrate that the common GP entity was the

principal beneficiary of the merger, garnering billions of dollars in increased annual distributions—including hundreds of millions of dollars diverted from the unitholders of the acquired entity. Also analyzed the economic and financial prospects of the acquisition target, supporting expert testimony that its contractual arrangements and commercial position providing gathering and processing services in the most prolific US natural gas producing basins – coupled with a stable balance sheet and credit profile – made the acquired entity a solid and stable going concern, despite a downturn in commodity prices.

- **Damages for LNG distribution operation**
  In a commercial arbitration, estimated appropriate discount rates for valuation of lost profits damages to a liquefied natural gas (LNG) distribution business in a West African country arising from alleged delays and defects caused by the manufacturer of liquefaction equipment. Also estimated the unlevered cost of capital for the LNG distribution business with reference to comparable companies in the fuel distribution business and analyzed the differential risk associated with delayed capital expenditures versus operating cash flows of the business as a whole.

- **Oil & gas tax accounting litigation**
  Performed analysis relevant to a major international oil company's claim for tax refunds of approximately $1 billion related to the company's oil and natural gas projects in the Middle East and Southeast Asia. Developed a cost-based estimate of the economic value of the commodities at the wellhead, based on accounting data related to the production operations and financial arrangements of the joint venture entities that developed and processed the mineral resources in question.

- **Tax valuation of shale gas leases**
  For a natural gas exploration and production company, performed discounted cash flow (DCF) valuations of certain shale gas leases to assess the reasonableness of tax losses associated with those leases. Key issues affecting the value related to well production rates and decline curves, required capital investment in a pipeline to transport the gas to market, and expected natural gas prices over the production horizon. Developed a straightforward but nuanced approach to fitting hyperbolic production decline curves based on contemporaneous local production data, and implemented a dynamic calculation of level per-unit capital cost recovery charges as a function of production levels. The DCF valuation model was designed to flexibly incorporate different forward price curves and drilling schedules to match different valuation dates.

- **Damages due to gas field blowouts**
  In an international arbitration concerning an oil and gas development joint venture, assisted in quantifying damages arising from a series of blowouts that suspended development of a natural gas field. Having determined that gas from the field would likely have displaced more expensive fuels for electric generation, the Brattle team estimated the electricity cost savings that would have been realized but-for the blowouts. This involved using public information to determine how fuel costs and plant

efficiencies interacted to determine the marginal generation fuel in past and (forecasted) future years.

- **Damages from breach of service agreement**
  For a petroleum products wholesaler, assisted in the estimation of commercial damages due to a pipeline's cancellation of distillate service in breach of a prior settlement agreement. The quantification of lost profits required estimation of counterfactual (but-for) sales volumes and profit margins, which depended on market forces and operational constraints imposed by the pipeline. Also performed an analysis comparing information from nominations and transit calendars provided by the pipeline to in-transit inventory and delivery data compiled by the wholesaler from receipt and delivery tickets to examine whether operational issues contributed to suppressed sales for the wholesaler before the start of the damages period.

- **Oil markets primer**
  With other Brattle consultants, authored a report for the American Petroleum Institute (API) that provided a comprehensive overview of oil and petroleum product markets. "Understanding Crude Oil and Product Market" discusses the implications of increased North American crude oil production in context of the global market for crude. Technological advancements in drilling methods have made unconventional resources such as shale oil and oil sands more accessible and economic. US crude oil production increased by 50% from 2008 to 2013, which drove the ongoing decline in US imports of crude oil. However, the transportation infrastructure and refining capacity necessary to connect these new supplies to the world market developed more slowly, leading prices for US benchmark crudes (WTI) to diverge from global benchmarks (Brent). The report discusses key trends affecting the industry, and describes key issues that will continue to affect North American crude oil and petroleum products markets in the coming years.

- **Market power and price discrimination in a wholesale gasoline market**
  For the owner/operators of a chain of on-highway gas stations in a metropolitan market, assisted with analysis examining pricing by the wholesale distributor. The analysis included statistical evaluation of pricing data for the client's stations and similarly situated stations.

- **Evaluating energy commodity futures for fuel cost forecasting**
  In a proceeding before the Wisconsin Public Service Commission, supported an electric utility filing for rate adjustment based on its estimated fuel costs for the upcoming year. Brattle's analysis examined a proposed adjustment to the NYMEX commodity futures prices for forecasting fuel prices. Analyzed time series data comparing natural gas futures prices to eventual contract settlement prices to evaluate whether the proposed downward adjustments resulted from data selection issues or from risk premiums embedded in commodity futures prices. Also reviewed the finance literature and applied established asset pricing theory to determine whether commodity futures risk premiums could be isolated in an efficient markets framework, and whether they might

lead energy futures prices to systematically over- or under-predict eventual settlement prices.

ENERGY INDUSTRY VALUATION AND FINANCIAL MODELING

- **Market potential and valuation of merchant CCGT investment**
  Worked with Brattle consultants to advise the corporate strategy group of a foreign utility company on a potential equity investment in a new Combined Cycle Gas Turbine (CCGT) plant in one of the US RTO regions. Analyzed electricity market fundamentals and presented research on key issues of regulation and market design in seven deregulated wholesale power markets. The Brattle team advised the client on "screening" of market zones based on market structures and fundamentals. Also assisted in developing and presenting discounted cash flow valuation models using standard CCGT cost inputs and energy, ancillary services, and capacity market revenue forecasts based on modeling of RTO power markets.

- **Policy evaluation of a proposed new power plant**
  While at the University of Chicago, analyzed the potential impact on consumers of building a state-subsidized combined cycle gas turbine (CCGT) power plant in a deregulated mid-western energy market. Using publicly-available locational marginal price (LMP) and historical load data, modeled the price-elasticity of supply to estimate the local energy market impact of building the proposed plant. Comparing this impact with the ratepayer impact of the state-guaranteed power purchase agreement provided a benchmark against which to judge the cost-effectiveness of the public subsidy.

- **Equity valuation methodologies for publicly traded utility companies**
  While interning at Exelon Corporation, completed a meta-analysis of equity valuation methodologies applied to large companies in the electric utilities industry. A key issue in the analysis concerned differential treatment of power generation, transmission and distribution, and retail power marketing businesses for competitive integrated vs. fully-regulated companies. Presented the results to Exelon's financial leadership team.

- **Economics of renewables integration**
  For a business case competition sponsored by DTE Energy, built a "renewables-firming" levelized cost of electricity (LCOE) model to support the evaluation of resource planning options. The model adjusted the costs of intermittent solar and wind generating technologies so they could be compared on a firm-capacity basis with on-demand fossil and hydroelectric resources.

PUBLICATIONS

- "Use of the Benchmark Utility Approach in the BCUC's Generic Cost of Capital Proceeding," submitted on behalf of Pacific Norther Gas Ltd. and Corix Multi-Utility Services Inc. in British Columbia Utilities Commission (BCUC) Project No. 1599176 Generic Cost of Capital Proceeding for 2022 (July 21, 2021)

- "FERC's Policies Are Incentivizing the Exercise of Market Power through Under-Development of Oil and Natural Gas Liquids Pipeline Capacity," *Energy Law Journal*, Vol. 42, No. 1 (May 2021)
- "Analysis of 2014–2019 Industry-wide Oil Pipeline Cost Change for Determination of FERC Oil Pipeline Index Differential," with Matthew P. O'Loughlin, submitted on behalf of Airlines for America, Chevron Products Company, National Propane Gas Association, and Valero Marketing and Supply Company in FERC Docket No. RM20-14-000, *Five Year Review of Oil Pipeline Index* (September 2020)
- "Analysis of FERC's Proposed Modifications for Evaluating Challenges to Oil Pipeline Index Rate Changes," with Matthew P. O'Loughlin, submitted on behalf of Joint Complainants in FERC Docket Nos. OR14-35-003 *et al.* and AD20-10-000 (June 2020)
- "AESO Cost of New Entry Analysis: Combustion Turbines and Combined-Cycle Plants with November 1, 2021 Online Date," with Johannes P. Pfeifenberger, Kathleen Spees et al., commissioned by the Alberta Electric System Operator (AESO) (September 4, 2018)
- "Analysis of the Effect of the Tax Cuts and Jobs Act and Revised Policy Statement Treatment of Income Taxes on Commission-Jurisdictional Rates," with Matthew P. O'Loughlin and Daniel S. Arthur, submitted on behalf of United Airlines Petitioners and Aligned Shippers, in FERC Docket No. RM18-12-000 (May 2018)
- "Six Implications of the New Tax Law for Regulated Utilities," with Robert Mudge and Bente Villadsen, The Brattle Group (January 2018)
- "Analysis of Initial Comments Regarding Commission's Income Tax Allowance Policy for Partnership Pipelines," with Matthew P. O'Loughlin and S. Daniel Arthur, submitted on behalf of United Airlines Petitioners and Aligned Shippers, in FERC Docket No. PL17-1-000 (April 2017)
- "Aurizon Network 2016 Access Undertaking: Aspects of the WACC," with Bente Villadsen, prepared for Aurizon Network for submission to the Queensland Competition Authority (November 2016)
- "Understanding Crude Oil and Product Markets," with Steven Levine, Gary Taylor, and Daniel Arthur, prepared for the American Petroleum Institute (September 2014)

PRESENTATIONS & SPEAKING ENGAGMENTS

- "Impact of the New Tax Law on Utility Deferred Taxes," with Bente Villadsen and Elliott Metzler, presented at the CRRI Advanced Workshop in Regulation and Competition, 37th Annual Eastern Conference (June 7, 2018)
- "Natural Gas Pipeline FERC ROE," with Michael Vilbert, Interstate Natural Gas Association of America (INGAA) Rate of Return Seminar (March 2016)
- "Paying for Pipelines. Who is Likely to Pay for Additional Capacity?" with Matthew O'Loughlin and Evan Klein, LSI Energy in the Northeast Conference, Boston (September 9, 2013)

DIRECT TESTIMONY
OF
MICHAEL R. TOLLETH

ATTACHMENT MRT-2

TECHNICAL APPENDIX

May 1, 2023

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TECHNICAL APPENDIX

I. PURPOSE

Q1. What is the purpose of this technical appendix?

A1. The purpose is to provide more comprehensive academic and empirical support for the standard models and finance techniques I employ in my testimony. Additionally, I provide more detailed technical explanations of how I implement these models techniques, including the specific formulas and input parameters employed.

Specifically, Section II covers techniques used to account for differences in financial risk, and Section III explains the Empirical CAPM ("ECAPM").

II. CAPITAL STRUCTURE AND FINANCIAL RISK

Q2. What techniques do you employ to account for the impact of financial risk on the cost of equity?

A2. As discussed in my testimony, I employ two such techniques.

One common textbook approach is to "unlever" and "re-lever" market betas according to the approach first developed by Professor Hamada.[1] Specifically, in the Hamada approach, the "levered" market beta measured for a sample company is used to calculate what beta would be associated with an all-equity financed firm with the same level of business risk. This is the "unlevered beta" or "assets beta," is then "re-levered" to determine the equity beta associated with the level of financial risk contained in the target company's capital structure.

The other technique I use assumes the overall cost of capital is constant between the estimate obtained for the sample and the entity to which it is applied. Comparing and averaging the overall cost of capital is a way to "unlever" cost of equity estimates measured

[1] Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporate Finance," *The Journal of Finance,* 24: 13–31 (March 1969).

for sample companies with different capital structures and "re-lever" them at a target capital structure.

Q3. What is the conceptual basis for these techniques?

A3. If the companies in a sample are truly comparable in terms of the systematic risks of the underlying assets, then the overall cost of capital of each company should be about the same across companies (except for sampling error), so long as they do not use extreme leverage or no leverage. The intuition here is as follows. A firm's asset value (and return) is allocated between equity and debt holders.[2] The expected return to the underlying asset is therefore equal to the value weighted average of the expected returns to equity and debt holders—which is the overall cost of capital (r^*), or the expected return on the assets of the firm as a whole.[3]

$$r^* = \frac{E}{V} \times r_E + \frac{D}{V} \times r_D (1 - \tau_c) \qquad \text{(A-1)}$$

where r_D is the market cost of debt,

r_E is the market cost of equity,

τ_c is the corporate income tax rate,

D is the market value of the firm's debt,

E is the market value of the firm's equity, and

$V = E + D$ is the total market value of the firm.

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[2] Other claimants can be added to the weighted average if they exist. For example, when a firm's capital structure contains preferred equity, the term $\frac{P}{V} \times r_P$ is added to the expression for the overall cost of capital shown in Equation (A-1), where P refers to the market value of preferred equity, r_P is the cost of preferred equity and $V = E + D + P$. In my analysis, I attribute the same implied yield to the cost of preferred equity as to the cost of debt.

[3] As this is on an after-tax basis, the cost of debt reflects the tax value of interest deductibility. Note that the precise formulation of the weighted average formula representing the required return on the firm's *assets* independent of financing (sometimes called the *unlevered* cost of capital) depends on specific assumptions made regarding the value of tax shields from tax-deductible corporate debt, the role of personal income tax, and the cost of financial distress. See Taggart, R.A., "Consistent Valuation and Cost of Capital Expressions with Corporate and Personal Taxes," *Financial Management*, 1991; 20(3) for a detailed discussion of these assumptions and formulations. Equation () represents the overall cost of capital to the firm, which can be assumed to be constant across a relatively broad range of capital structures.

Since the overall cost of capital is the cost of capital compensating for the underlying business risk associated with the firm's assets and operations, it is reasonable to believe that this quantity should be comparable across companies in the same industry, so long as capital structures do not involve unusual leverage ratios for that industry.[4]

The notion that the overall cost of capital is constant across a broad middle range of capital structures is based upon the Modigliani-Miller theorem that choice of financing does not affect the firm's value. Franco Modigliani and Merton Miller eventually won Nobel Prizes in part for their work on the effects of debt.[5] Their 1958 paper made what is in retrospect a very simple point: if there are no taxes and no risk to the use of excessive debt, use of debt will have no effect on a company's operating cash flows (*i.e.*, the cash flows to investors as a group, debt and equity combined). If the operating cash flows are the same regardless of how the company finances its assets, then the value of the firm cannot be affected at all by the debt ratio. In cost of capital terms, this means the overall cost of capital is constant regardless of the debt ratio.

Obviously, the simple and elegant Modigliani-Miller theorem makes some counterfactual assumptions: no taxes and no cost of financial distress from excessive debt. However, subsequent research, including some by Modigliani and Miller,[6] showed that while taxes and costs to financial distress affect a firm's incentives when choosing its capital structure

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[4] Empirically, companies within the same industry tend to have similar capital structures, while typical capital structures may vary between industries, so whether a leverage ratio is "unusual" depends upon the company's line of business.

[5] Franco Modigliani and Merton H. Miller (1958), "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48, pp. 261-297.

[6] Franco Modigliani and Merton H. Miller (1963), "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review*, 53, pp. 433-443.

as well as its overall cost of capital,[7] the latter can still be shown to be constant across a broad range of capital structures.[8]

This reasoning suggests that one could compute the overall cost of capital for each of the sample companies and then average to produce an estimate of the overall cost of capital associated with the underlying asset risk. Assuming that the overall cost of capital is constant across a broad range of typical capital structures, one can then re-arrange the overall cost of capital formula to estimate what the implied cost of equity is at the target company's capital structure.[9]

Q4. What specific formulas do you apply to unlever and relever betas according to the Hamada approach?

A4. Hamada procedures account for the impact of financial risk recognizing that, under general conditions, the value of a firm can be decomposed into its value with and without the "tax shield" resulting from the tax-deductibility of interest on corporate debt:

$$V = V_U + PV(ITS) \quad \text{(A-2)}$$

where $V = E + D$ is the total value of the firm as in Equation (A-1),

V_U is the "unlevered" value of the firm—its value if financed entirely by equity,

$PV(ITS)$ is the present value of the interest tax shields associated with debt

Various formulations exist, based on subtly different assumptions about the risk associated with the tax benefits of debt. For a company with a fixed book-value capital structure and

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7 When a company uses a high level of debt financing, for example, there is significant risk of bankruptcy and all the costs associated with it. The so called costs of financial distress that occurs when a company is over-leveraged can increase its cost of capital. In contrast a company can generally decrease its cost of capital by taking on reasonable levels of debt, owing in part to the deductibility of interest from corporate taxes.

8 This is a simplified treatment of what is generally a complex and on-going area of academic investigation. The roles of taxes, market imperfections and constraints, etc. are areas of on-going research and differing assumptions can yield subtly different formulations for how to formulate the weighted average cost of capital that is constant over all (or most) capital structures.

9 Market value capital structures are used in estimating the overall cost of capital for the sample companies.

no additional costs associated with the use of debt financing, it can be shown that the decomposition of value implies:[10]

$$r_E = r_U + \frac{D}{E}(1 - \tau_c)(r_U - r_D) \qquad \text{(A-3)}$$

where r_U is the "unlevered cost of capital"—the required return on assets if the firm's assets were financed with 100% equity and zero debt—and the other parameters are defined as in Equation (A-1).

Replacing each of these returns by their CAPM representation and simplifying them gives the following relationship between the "levered" equity beta β_L for a firm (*i.e.*, the one observed in market data as a consequence of the firm's actual market value capital structure) and the "unlevered" beta β_U that would be measured for the same firm if it had no debt in its capital structure:

$$\beta_L = \beta_U + \frac{D}{E}(1 - \tau_c)(\beta_U - \beta_D) \qquad \text{(A-4)}$$

In this equation, β_L is beta associated with the "levered cost of capital"—the required return on equity if the firm's assets are financed with debt and equity—β_U is the beta associated with a hypothetical unlevered firm whose assets are financed with 100% equity and zero debt—and β_D is the beta on the firm's debt. Since the beta on an investment grade firm's debt is much lower than the beta of its assets (i.e., $\beta_D < \beta_U$), this equation embodies the fact that increasing financial leverage (and thereby increasing the debt to equity ratio) increases the systematic risk of levered equity (β_L).

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[10] This follows the development in Fernandez (2003). Other standard papers in this area include Hamada (1972), Miles and Ezzell (1985), Harris and Pringle (1985), Fernandez (2006). *See* Fernandez, P., "Levered and Unlevered Beta," IESE Business School Working Paper WP-488, University of Navarra, Jan 2003 (rev. May 2006); Hamada, R.S., "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stock," *Journal of Finance*, 27, May 1972, pp. 435-452; Miles, J.A. and J.R. Ezzell, "Reformulating Tax Shield Valuation: A Note," *Journal of Finance*, XL5, Dec 1985, pp. 1485-1492; Harris, R.S. and J.J. Pringle, "Risk-Adjusted Discount Rates Extensions form the Average-Risk Case," *Journal of Financial Research*, Fall 1985, pp. 237-244; Fernandez, P., "The Value of Tax Shields Depends Only on the Net Increases of Debt," IESE Business School Working Paper WP-613, University of Navarra, 2006.) Additional discussion can be found in Brealey, Myers, and Allen (2014) and Taggart, R. A., "Consistent Valuation and Cost of Capital Expressions with Corporate and Personal Taxes," *Financial Management*, 1991; 20(3).

An alternative formulation derived by Harris and Pringle (1985) provides the following equation, under the assumption that the tax benefits of debt financing have the same risk as the company's cash flows.

$$\beta_L = \beta_U + \frac{D}{E}(\beta_U - \beta_D) \qquad \text{(A-5)}$$

Unlike Equation (A-4), Equation (A-5) does not depend on the corporate tax rate.[11] However, both equations account for the fact that increased financial leverage increases the systematic risk of equity that will be measured by its market beta. Both equations allow an analyst to adjust for differences in financial risk by translating back and forth between β_L and β_U. In principle, Equation (A-3) is more appropriate for use with regulated utilities, which are typically deemed to maintain a fixed book value capital structure. However, I employ both formulations when adjusting my CAPM and ECAPM estimates for financial risk, and consider the results from both as sensitivities in my analysis.

Q5. How do you apply the beta unlevering and relevering formulas?

A5. It is clear that the beta of debt needs to be determined as an input to either Equation (A-4) or Equation (A-5). It is difficult to derive precise measurements of debt betas for individual companies, since unlike shares of stock, individual companies' bond issuances do not trade as actively on open markets. However, the standard corporate finance textbook written by Professors Berk & DeMarzo reports an average debt beta of 0.05 for A rated debt and a beta of 0.10 for BBB rated debt.[12] I employ these values in my calculations.

Once a decision on debt betas is made, the levered equity beta of each sample company can be computed (*e.g.*, by Bloomberg or *Value Line*) from market stock return data and then translated to an unlevered beta at the company's market value capital structure. The unlevered betas for the sample companies are comparable on an "apples to apples" basis, since they reflect the systematic risk inherent in the assets of the sample companies, independent of their financing. The unlevered betas are averaged to produce an estimate

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[11] For this reason, I refer Equation (A-5) as the Hamada adjustment "without taxes."

[12] Berk, J. & DeMarzo, P., *Corporate Finance*, 3rd Edition, 2014, p. 413.

of the industry's unlevered beta. To estimate the cost of equity for the regulated target company, this estimate of unlevered beta can be "re-levered" to the regulated company's capital structure. Finally, the CAPM (and/or ECAPM) is applied with this levered beta, which reflects both the business and financial risk of the target company.

Q6. What formula do you apply to adjust for financial risk in the DCF model?

A6. Using the DCF estimates for the levered cost of equity of the individual sample companies (with their different capital structures), I then calculate each company's overall cost of capital according to Equation A-1.

Based on the empirical evidence that this quantity is constant across a broad range of capital structures, I compare the overall cost of capital estimates for the sample companies on an apples-to-apples basis (i.e., having removed the effects of differing financial leverage on financial risk) to obtain a sample average overall cost of capital that reflects the business risk of the sample. I then apply this sample average at the Company's regulatory capital structure to determine the cost of equity reflecting (i) the sample's business risk, and (ii) the target company's financial leverage.

Note that in contrast to Equations (A-4) and (A-5), which apply directly to the beta employed in the CAPM, Equation (A-1) is applicable to any cost of equity estimate derived from publicly-traded stock. Therefore, I apply Equation (A-1) to both my DCF-based and CAPM-based estimates. Ultimately, I employ three different (but conceptually linked) versions of a financial risk adjustment calculation to my CAPM estimates, and consider the results as sensitivities. For the DCF estimates, I employ only Equation (A-1).

III. THE EMPIRICAL CAPM

Q7. Please describe and explain the ECAPM.

A7. Yes. Empirical research has shown that the Empirical Capital Asset Pricing Model ("ECAPM") tends to perform better as low-beta stocks tend to have higher risk premiums than predicted by the CAPM and high-beta stocks tend to have lower risk premiums than predicted.[13] A number of variations on the original CAPM theory have been proposed to explain this finding, but the observation itself can also be used to estimate the cost of capital directly, using beta to measure relative risk by making a direct empirical adjustment to the CAPM.

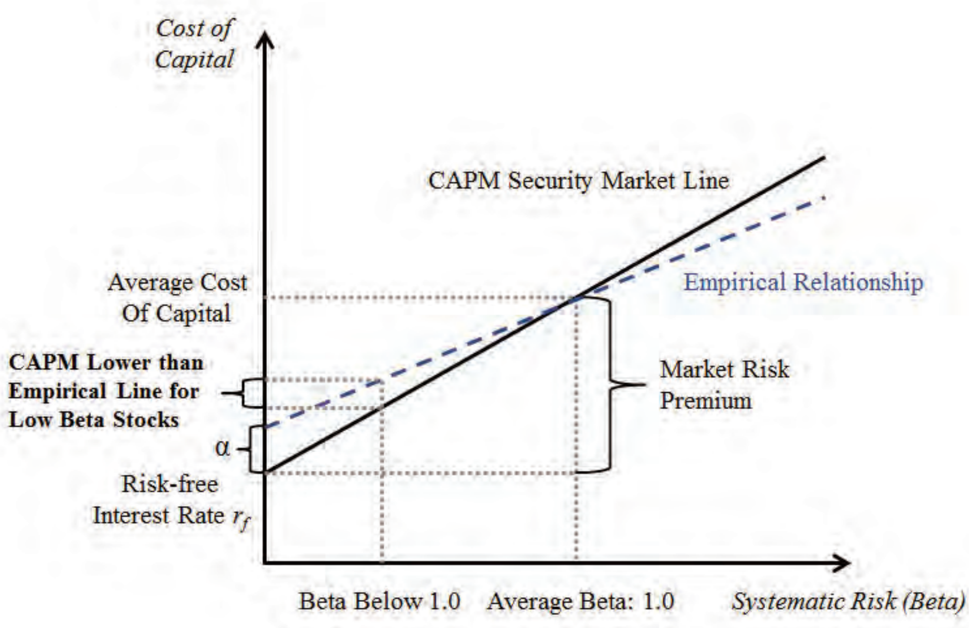
The ECAPM is thus a variation on the CAPM that makes direct use of these empirical findings. It estimates the cost of capital with the equation,

$$r_i = r_f + \alpha + \beta_i \times (MRP - \alpha) \qquad \text{(A-6)}$$

where $\boldsymbol{\alpha}$ is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM.

The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line as shown in Figure A-1. This results in a Security Market Line that more closely matches the results of empirical tests. Thus, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

Figure A-1
The Empirical Security Market Line



13 *See* Exhibit BV-2 for references to relevant academic articles.

Q8. Please summarize the empirical evidence supporting the use of the CAPM.

A8. Figure A-2 below summarizes the empirical results of tests of the CAPM, including their estimates of the "alpha" parameter necessary to improve the accuracy of the CAPM's predictions of realized returns. Importantly, many of these studies used short-term Treasury bill yields to represent the risk-free rate. Since using long-term Treasury yields also serves to somewhat "flatten" the risk-return relationship, I employ an alpha value of 1.50 percent in implementing the ECAPM with a long-term bond yield as the risk free rate. This is reduced by 2.5 percentage points relative to 4.0 percent, which represents a conservatively low assessment of the "consensus" result from the studies in Figure A-2.

Figure A-2

EMPIRICAL EVIDENCE ON THE ALPHA FACTOR IN ECAPM[*]

AUTHOR	RANGE OF ALPHA	PERIOD RELIED UPON
Black (1993)[1]	1% for betas 0 to 0.80	1931-1991
Black, Jensen and Scholes (1972)[2]	4.31%	1931-1965
Fama and McBeth (1972)	5.76%	1935-1968
Fama and French (1992)[3]	7.32%	1941-1990
Fama and French (2004)[4]	N/A	
Litzenberger and Ramaswamy (1979)[5]	5.32%	1936-1977
Litzenberger, Ramaswamy and Sosin (1980)	1.63% to 3.91%	1926-1978
Pettengill, Sundaram and Mathur (1995)[6]	4.6%	1936-1990

[*]The figures reported in this table are for the longest estimation period available and, when applicable, use the authors' recommended estimation technique. Many of the articles cited also estimate alpha for sub-periods and those alphas may vary.

[1]Black estimates alpha in a one step procedure rather than in an un-biased two-step procedure.
[2]Estimate a negative alpha for the subperiod 1931-39 which contain the depression years 1931-33 and 1937-39.
[3]Calculated using Ibbotson's data for the 30-day treasury yield.
[4]The article does not provide a specific estimate of alpha; however, it supports the general finding that the CAPM underestimates returns for low-beta stocks and overestimates returns for high-beta stocks.
[5]Relies on Lizenberger and Ramaswamy's before-tax estimation results. Comparable after-tax alpha estimate is 4.4%.
[6]Pettengill, Sundaram and Mathur rely on total returns for the period 1936 through 1990 and use 90-day treasuries. The 4.6% figure is calculated using auction averages 90-day treasuries back to 1941 as no other series were found this far back.

Sources:
Black, Fischer. 1993. Beta and Return. *The Journal of Portfolio Management* 20 (Fall): 8-18.
Black, F., Michael C. Jensen, and Myron Scholes. 1972. The Capital Asset Pricing Model: Some Empirical Tests, from Studies in the theory of Capital Markets. In *Studies in the Theory of Capital Markets*, edited by Michael C. Jensen, 79-121. New York: Praeger.
Fama, Eugene F. and James D. MacBeth. 1972. Risk, Returns and Equilibrium: Empirical Tests. *Journal of Political Economy* 81 (3): 607-636.
Fama, Eugene F. and Kenneth R. French. 1992. The Cross-Section of Expected Stock Returns. *Journal of Finance* 47 (June): 427-465.
Fama, Eugene F. and Kenneth R. French. 2004. The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives* 18 (3): 25-46.
Litzenberger, Robert H. and Krishna Ramaswamy. 1979. The Effect of Personal Taxes and Dividends on Capital Asset Prices, Theory and Empirical Evidence. *Journal of Financial Economics* XX (June): 163-195.
Litzenberger, Robert H. and Krishna Ramaswamy and Howard Sosin. 1980. On the CAPM Approach to Estimation of a Public Utility's Cost of Equity Capital. *The Journal of Finance* 35 (2): 369-387.

Q9. Does this conclude the technical appendix to your testimony?

A9. Yes.

Schedule No. MT-1

Table of Contents

Schedule No. MT-2

Water Sample

Classification of Companies by Assets

Company	Company Category
Amer. States Water	R
Amer. Water Works	R
Artesian Res Corp	R
California Water	R
Essential Utilities	R
Global Water Resources Inc	R
Middlesex Water	R
SJW Group	R
York Water Co. (The)	R

Sources and Notes:
Calculations based on EEI definitions and Company 10K filings:
R = Regulated (greater than 80 percent of total assets are regulated).
MR = Mostly Regulated (Less than 80 percent of total assets are regulated)

Workpaper #1 to Schedule No. MT-2

Full Sample

Company	Annual Revenue (Q1 2023) ($ million)	Regulated Assets	Market Cap. (Q1 2023) ($ million)	Value Line Betas	S&P Credit Rating	Long-Term Growth Estimate
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	$508	R	$3,201	0.70	A+	4.5%
Amer. Water Works	$3,881	R	$25,641	0.90	A	7.4%
California Water	$874	R	$3,147	0.70	A	8.4%
Essential Utilities	$2,294	R	$11,177	0.95	A	6.4%
Middlesex Water	$165	R	$1,343	0.75	A	2.7%
SJW Group	$668	R	$2,324	0.80	A-	7.8%
York Water Co. (The)	$61	R	$632	0.80	A-	4.9%
Core Sample Average	**$1,207**		**$6,781**	**0.80**	**A**	**6.0%**
Artesian Res Corp	$102	R	$506	0.70	n/a	4.0%
Global Water Resources Inc	$46	R	$298	0.80	n/a	15.0%
Expanded Sample Average	**$955**		**$5,363**	**0.79**		**6.8%**

Sources and Notes:
[1]: Bloomberg as of March 31, 2023.
[2]: Key R - Regulated (80% or more of assets regulated).
MR - Mostly Regulated (less than 80% of assets regulated).
[3]: See Schedule No. MT-3 Panels A through I.
[4]: See Schedule No. MT-10
[5]: Bloomberg as of March 31, 2023.
[6]: See Schedule No. MT-5.

Schedule No. MT-3

Market Value of the Water Sample

Panel A: Amer. States Water

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$710	$710	$687	$649	$605	$562	$532	[a]
Shares Outstanding (in millions) - Common	37	37	37	37	37	37	37	[b]
Price per Share - Common	$87	$87	$87	$74	$80	$71	$53	[c]
Market Value of Common Equity	$3,201	$3,201	$3,205	$2,724	$2,959	$2,624	$1,960	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$3,201	$3,201	$3,205	$2,724	$2,959	$2,624	$1,960	[f]= [d] + [e]
Market to Book Value of Common Equity	4.51	4.51	4.66	4.19	4.90	4.67	3.69	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$151	$151	$131	$119	$127	$117	$146	[j]
Current Liabilities	$397	$397	$160	$113	$133	$108	$196	[k]
Current Portion of Long-Term Debt	$2	$2	$2	$2	$2	$2	$40	[l]
Net Working Capital	($243)	($243)	($27)	$8	($3)	$11	($10)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$256	$256	$32	$0	$32	$0	$69	[n]
Adjusted Short-Term Debt	$243	$243	$27	$0	$3	$0	$10	[o] = See Sources and Notes.
Long-Term Debt	$477	$477	$610	$578	$492	$437	$281	[p]
Book Value of Long-Term Debt	$722	$722	$639	$581	$497	$439	$332	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$424	$424	$424	$491	$560	$376	$388	
Carrying Amount	$450	$450	$450	$416	$444	$285	$325	
Adjustment to Book Value of Long-Term Debt	($26)	($26)	($26)	$75	$115	$91	$63	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$696	$696	$613	$656	$613	$530	$395	[s] = [q] + [r].
Market Value of Debt	$696	$696	$613	$656	$613	$530	$395	[t] = [s].
MARKET VALUE OF FIRM	$3,896	$3,896	$3,818	$3,380	$3,572	$3,154	$2,355	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	82.15%	82.15%	83.94%	80.59%	82.85%	83.18%	83.24%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	17.85%	17.85%	16.06%	19.41%	17.15%	16.82%	16.76%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
Capital structure from 1st Quarter, 2023 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-3

Market Value of the Water Sample

Panel B: Amer. Water Works

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$7,693	$7,693	$7,460	$6,583	$6,243	$5,932	$5,451	[a]
Shares Outstanding (in millions) - Common	182	182	182	181	181	181	178	[b]
Price per Share - Common	$141	$141	$158	$143	$118	$105	$81	[c]
Market Value of Common Equity	$25,641	$25,641	$28,803	$25,882	$21,445	$19,019	$14,435	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$25,641	$25,641	$28,803	$25,882	$21,445	$19,019	$14,435	[f]= [d] + [e]
Market to Book Value of Common Equity	3.33	3.33	3.86	3.93	3.43	3.21	2.65	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$1,250	$1,250	$853	$1,466	$1,801	$691	$729	[j]
Current Liabilities	$2,811	$2,811	$1,648	$2,451	$2,767	$2,156	$2,539	[k]
Current Portion of Long-Term Debt	$290	$290	$66	$321	$60	$81	$421	[l]
Net Working Capital	($1,271)	($1,271)	($729)	($664)	($906)	($1,384)	($1,389)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1,175	$1,175	$321	$1,115	$1,641	$1,201	$1,183	[n]
Adjusted Short-Term Debt	$1,175	$1,175	$321	$664	$906	$1,201	$1,183	[o] = See Sources and Notes.
Long-Term Debt	$10,999	$10,999	$10,428	$9,412	$8,712	$7,669	$6,403	[p]
Book Value of Long-Term Debt	$12,464	$12,464	$10,815	$10,397	$9,678	$8,951	$8,007	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$10,075	$10,075	$10,075	$11,818	$11,807	$9,770	$7,921	
Carrying Amount	$11,207	$11,207	$11,207	$10,396	$9,656	$8,664	$7,638	
Adjustment to Book Value of Long-Term Debt	($1,132)	($1,132)	($1,132)	$1,422	$2,151	$1,106	$283	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$11,332	$11,332	$9,683	$11,819	$11,829	$10,057	$8,290	[s] = [q] + [r].
Market Value of Debt	$11,332	$11,332	$9,683	$11,819	$11,829	$10,057	$8,290	[t] = [s].
MARKET VALUE OF FIRM	$36,973	$36,973	$38,486	$37,701	$33,274	$29,076	$22,725	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69.35%	69.35%	74.84%	68.65%	64.45%	65.41%	63.52%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	30.65%	30.65%	25.16%	31.35%	35.55%	34.59%	36.48%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
Capital structure from 1st Quarter, 2023 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-3

Market Value of the Water Sample

Panel C: Artesian Res Corp

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$188	$188	$181	$172	$162	$155	$148	[a]
Shares Outstanding (in millions) - Common	10	10	9	9	9	9	9	[b]
Price per Share - Common	$53	$53	$48	$40	$34	$39	$36	[c]
Market Value of Common Equity	$506	$506	$449	$377	$321	$358	$334	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$506	$506	$449	$377	$321	$358	$334	[f]= [d] + [e]
Market to Book Value of Common Equity	2.69	2.69	2.49	2.19	1.97	2.31	2.25	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$28	$28	$16	$15	$13	$13	$14	[j]
Current Liabilities	$44	$44	$52	$44	$28	$40	$30	[k]
Current Portion of Long-Term Debt	$2	$2	$2	$2	$2	$2	$5	[l]
Net Working Capital	($14)	($14)	($35)	($28)	($13)	($25)	($11)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$20	$20	$28	$23	$9	$19	$16	[n]
Adjusted Short-Term Debt	$14	$14	$28	$23	$9	$19	$11	[o] = See Sources and Notes.
Long-Term Debt	$176	$176	$143	$142	$144	$116	$105	[p]
Book Value of Long-Term Debt	$192	$192	$172	$167	$154	$137	$121	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$163	$163	$163	$163	$171	$158	$117	
Carrying Amount	$145	$145	$145	$145	$144	$146	$118	
Adjustment to Book Value of Long-Term Debt	$18	$18	$18	$18	$27	$12	($1)	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$211	$211	$191	$185	$182	$148	$120	[s] = [q] + [r].
Market Value of Debt	$211	$211	$191	$185	$182	$148	$120	[t] = [s].
MARKET VALUE OF FIRM	$716	$716	$640	$562	$502	$507	$455	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	70.59%	70.59%	70.18%	67.06%	63.82%	70.70%	73.53%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	29.41%	29.41%	29.82%	32.94%	36.18%	29.30%	26.47%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
Capital structure from 1st Quarter, 2023 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-3

Market Value of the Water Sample

Panel D: California Water

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$1,318	$1,318	$1,165	$930	$755	$714	$681	[a]
Shares Outstanding (in millions) - Common	56	56	54	51	49	48	48	[b]
Price per Share - Common	$57	$57	$58	$55	$49	$54	$37	[c]
Market Value of Common Equity	$3,147	$3,147	$3,132	$2,774	$2,403	$2,598	$1,798	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$3,147	$3,147	$3,132	$2,774	$2,403	$2,598	$1,798	[f]= [d] + [e]
Market to Book Value of Common Equity	2.39	2.39	2.69	2.98	3.18	3.64	2.64	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$296	$296	$272	$302	$270	$193	$166	[j]
Current Liabilities	$295	$295	$282	$655	$513	$384	$464	[k]
Current Portion of Long-Term Debt	$4	$4	$5	$5	$22	$106	$6	[l]
Net Working Capital	$5	$5	($4)	($348)	($221)	($85)	($293)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$70	$70	$50	$435	$335	$125	$275	[n]
Adjusted Short-Term Debt	$0	$0	$4	$348	$221	$85	$275	[o] = See Sources and Notes.
Long-Term Debt	$1,066	$1,066	$1,056	$781	$786	$723	$516	[p]
Book Value of Long-Term Debt	$1,071	$1,071	$1,065	$1,134	$1,030	$915	$797	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$977	$977	$977	$1,339	$944	$873	$850	
Carrying Amount	$1,056	$1,056	$1,056	$1,061	$786	$809	$815	
Adjustment to Book Value of Long-Term Debt	($79)	($79)	($79)	$278	$158	$64	$35	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$992	$992	$986	$1,412	$1,188	$979	$831	[s] = [q] + [r].
Market Value of Debt	$992	$992	$986	$1,412	$1,188	$979	$831	[t] = [s].
MARKET VALUE OF FIRM	$4,139	$4,139	$4,118	$4,186	$3,591	$3,577	$2,630	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	76.03%	76.03%	76.05%	66.27%	66.93%	72.64%	68.39%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	23.97%	23.97%	23.95%	33.73%	33.07%	27.36%	31.61%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
Capital structure from 1st Quarter, 2023 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-3

Market Value of the Water Sample

Panel E: Essential Utilities

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$5,377	$5,377	$5,255	$4,810	$4,613	$1,993	$1,972	[a]
Shares Outstanding (in millions) - Common	264	264	253	246	245	178	178	[b]
Price per Share - Common	$42	$42	$49	$44	$39	$36	$34	[c]
Market Value of Common Equity	$11,177	$11,177	$12,358	$10,692	$9,440	$6,499	$5,971	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$11,177	$11,177	$12,358	$10,692	$9,440	$6,499	$5,971	[f]= [d] + [e]
Market to Book Value of Common Equity	2.08	2.08	2.35	2.22	2.05	3.26	3.03	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$658	$658	$444	$348	$368	$144	$124	[j]
Current Liabilities	$1,022	$1,022	$678	$503	$827	$434	$259	[k]
Current Portion of Long-Term Debt	$209	$209	$132	$80	$115	$158	$104	[l]
Net Working Capital	($155)	($155)	($103)	($75)	($344)	($133)	($31)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$257	$257	$80	$75	$381	$38	$33	[n]
Adjusted Short-Term Debt	$155	$155	$80	$75	$344	$38	$31	[o] = See Sources and Notes.
Long-Term Debt	$6,409	$6,409	$5,916	$5,601	$4,790	$2,475	$2,063	[p]
Book Value of Long-Term Debt	$6,772	$6,772	$6,127	$5,757	$5,249	$2,670	$2,198	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$5,528	$5,528	$5,528	$6,482	$6,366	$3,324	$2,588	
Carrying Amount	$6,617	$6,617	$6,617	$5,947	$5,630	$3,077	$2,564	
Adjustment to Book Value of Long-Term Debt	($1,089)	($1,089)	($1,089)	$535	$736	$247	$24	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$5,683	$5,683	$5,038	$6,292	$5,985	$2,917	$2,222	[s] = [q] + [r].
Market Value of Debt	$5,683	$5,683	$5,038	$6,292	$5,985	$2,917	$2,222	[t] = [s].
MARKET VALUE OF FIRM	$16,860	$16,860	$17,396	$16,984	$15,425	$9,416	$8,193	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	66.29%	66.29%	71.04%	62.95%	61.20%	69.02%	72.87%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	33.71%	33.71%	28.96%	37.05%	38.80%	30.98%	27.13%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
Capital structure from 1st Quarter, 2023 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-3

Market Value of the Water Sample

Panel F: Global Water Resources Inc

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$44	$44	$30	$31	$35	$27	$14	[a]
Shares Outstanding (in millions) - Common	24	24	23	23	22	22	20	[b]
Price per Share - Common	$12	$12	$16	$17	$10	$10	$9	[c]
Market Value of Common Equity	$298	$298	$366	$383	$219	$210	$177	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$298	$298	$366	$383	$219	$210	$177	[f]= [d] + [e]
Market to Book Value of Common Equity	6.72	6.72	12.35	12.53	6.25	7.78	12.77	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$14	$14	$18	$23	$22	$18	$11	[j]
Current Liabilities	$16	$16	$17	$14	$10	$10	$11	[k]
Current Portion of Long-Term Debt	$4	$4	$4	$2	$0	$0	$0	[l]
Net Working Capital	$2	$2	$5	$11	$12	$8	$0	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$107	$107	$109	$113	$115	$115	$114	[p]
Book Value of Long-Term Debt	$111	$111	$113	$115	$115	$115	$114	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$104	$104	$104	$126	$128	$121	$108	
Carrying Amount	$105	$105	$105	$109	$113	$115	$115	
Adjustment to Book Value of Long-Term Debt	($1)	($1)	($1)	$17	$15	$6	($7)	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$110	$110	$112	$132	$130	$122	$108	[s] = [q] + [r].
Market Value of Debt	$110	$110	$112	$132	$130	$122	$108	[t] = [s].
MARKET VALUE OF FIRM	$408	$408	$478	$515	$349	$332	$285	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	73.12%	73.12%	76.64%	74.44%	62.80%	63.36%	62.18%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	26.88%	26.88%	23.36%	25.56%	37.20%	36.64%	37.82%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
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The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-3

Market Value of the Water Sample

Panel G: Middlesex Water

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$400	$400	$378	$349	$327	$254	$230	[a]
Shares Outstanding (in millions) - Common	18	18	18	17	17	16	16	[b]
Price per Share - Common	$76	$76	$102	$78	$57	$58	$37	[c]
Market Value of Common Equity	$1,343	$1,343	$1,795	$1,367	$987	$950	$597	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$1,343	$1,343	$1,795	$1,367	$987	$950	$597	[f]= [d] + [e]
Market to Book Value of Common Equity	3.35	3.35	4.75	3.92	3.01	3.74	2.59	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$2	$2	$2	$2	$2	$2	$2	[h]
Market Value of Preferred Equity	$2	$2	$2	$2	$2	$2	$2	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$37	$37	$33	$31	$40	$30	$25	[j]
Current Liabilities	$118	$118	$60	$66	$81	$93	$64	[k]
Current Portion of Long-Term Debt	$18	$18	$7	$8	$8	$8	$7	[l]
Net Working Capital	($62)	($62)	($19)	($27)	($33)	($56)	($32)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$56	$56	$15	$13	$34	$50	$28	[n]
Adjusted Short-Term Debt	$56	$56	$15	$13	$33	$50	$28	[o] = See Sources and Notes.
Long-Term Debt	$294	$294	$311	$278	$240	$165	$140	[p]
Book Value of Long-Term Debt	$368	$368	$333	$298	$281	$222	$175	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$139	$139	$139	$108	$159	$161	$103	
Carrying Amount	$147	$147	$147	$99	$148	$151	$101	
Adjustment to Book Value of Long-Term Debt	($9)	($9)	($9)	$9	$12	$10	$1	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$359	$359	$325	$307	$292	$232	$176	[s] = [q] + [r].
Market Value of Debt	$359	$359	$325	$307	$292	$232	$176	[t] = [s].
MARKET VALUE OF FIRM	$1,704	$1,704	$2,122	$1,676	$1,281	$1,185	$776	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	78.80%	78.80%	84.60%	81.54%	77.01%	80.20%	77.00%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.12%	0.12%	0.10%	0.12%	0.16%	0.21%	0.31%	[w] = [i] / [u].
Debt - Market Value Ratio	21.08%	21.08%	15.30%	18.34%	22.83%	19.59%	22.68%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
Capital structure from 1st Quarter, 2023 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-3

Market Value of the Water Sample

Panel H: SJW Group

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$1,111	$1,111	$1,028	$978	$884	$888	$458	[a]
Shares Outstanding (in millions) - Common	31	31	30	30	28	28	21	[b]
Price per Share - Common	$75	$75	$68	$61	$57	$62	$54	[c]
Market Value of Common Equity	$2,324	$2,324	$2,048	$1,815	$1,619	$1,776	$1,101	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$2,324	$2,324	$2,048	$1,815	$1,619	$1,776	$1,101	[f]= [d] + [e]
Market to Book Value of Common Equity	2.09	2.09	1.99	1.85	1.83	2.00	2.41	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$155	$155	$138	$123	$129	$488	$61	[j]
Current Liabilities	$265	$265	$218	$290	$238	$87	$95	[k]
Current Portion of Long-Term Debt	$4	$4	$39	$76	$22	$0	$0	[l]
Net Working Capital	($106)	($106)	($41)	($90)	($87)	$402	($34)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$160	$160	$76	$122	$131	$32	$39	[n]
Adjusted Short-Term Debt	$106	$106	$41	$90	$87	$0	$34	[o] = See Sources and Notes.
Long-Term Debt	$1,492	$1,492	$1,492	$1,303	$1,317	$511	$431	[p]
Book Value of Long-Term Debt	$1,602	$1,602	$1,571	$1,469	$1,427	$511	$465	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$1,294	$1,294	$1,294	$1,652	$1,571	$1,396	$490	
Carrying Amount	$1,492	$1,492	$1,492	$1,493	$1,288	$1,284	$431	
Adjustment to Book Value of Long-Term Debt	($198)	($198)	($198)	$159	$283	$112	$59	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$1,404	$1,404	$1,374	$1,628	$1,710	$623	$524	[s] = [q] + [r].
Market Value of Debt	$1,404	$1,404	$1,374	$1,628	$1,710	$623	$524	[t] = [s].
MARKET VALUE OF FIRM	$3,728	$3,728	$3,422	$3,443	$3,329	$2,399	$1,625	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	62.33%	62.33%	59.85%	52.71%	48.64%	74.02%	67.76%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	37.67%	37.67%	40.15%	47.29%	51.36%	25.98%	32.24%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
Capital structure from 1st Quarter, 2023 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-3

Market Value of the Water Sample

Panel I: York Water Co. (The)

($MM)

	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	Notes
MARKET VALUE OF COMMON EQUITY	DCF Capital Structure	03/31/23	03/31/22	03/31/21	03/31/20	03/31/19	03/31/18	
Book Value, Common Shareholder's Equity	$207	$207	$154	$145	$136	$127	$120	[a]
Shares Outstanding (in millions) - Common	14	14	13	13	13	13	13	[b]
Price per Share - Common	$44	$44	$44	$49	$40	$34	$31	[c]
Market Value of Common Equity	$632	$632	$581	$634	$523	$444	$401	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$632	$632	$581	$634	$523	$444	$401	[f]= [d] + [e]
Market to Book Value of Common Equity	3.05	3.05	3.76	4.37	3.84	3.49	3.33	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$14	$14	$12	$10	$10	$9	$8	[j]
Current Liabilities	$17	$17	$21	$12	$16	$10	$21	[k]
Current Portion of Long-Term Debt	$0	$0	$8	$0	$7	$0	$11	[l]
Net Working Capital	($3)	($3)	($2)	($2)	$1	($2)	($1)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	$1	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$1	[o] = See Sources and Notes.
Long-Term Debt	$139	$139	$144	$122	$95	$94	$78	[p]
Book Value of Long-Term Debt	$139	$139	$151	$122	$101	$94	$90	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$126	$126	$126	$168	$151	$115	$105	
Carrying Amount	$142	$142	$142	$149	$127	$104	$96	
Adjustment to Book Value of Long-Term Debt	($16)	($16)	($16)	$19	$24	$11	$9	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$123	$123	$135	$141	$126	$105	$99	[s] = [q] + [r].
Market Value of Debt	$123	$123	$135	$141	$126	$105	$99	[t] = [s].
MARKET VALUE OF FIRM	$756	$756	$716	$775	$649	$549	$500	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	83.68%	83.68%	81.10%	81.82%	80.62%	80.85%	80.17%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	16.32%	16.32%	18.90%	18.18%	19.38%	19.15%	19.83%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of March 31, 2023
Capital structure from 1st Quarter, 2023 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 1st Quarter, 2023 balance sheet information and a 15-trading day average closing price ending on 3/31/2023.
Prices are reported in Workpaper #1 to Schedule No. MT-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2018 to 2022 10-Ks.

Schedule No. MT-4

Water Sample

Capital Structure Summary of the Water Sample

Company	DCF Capital Structure			5-Year Average Capital Structure		
	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	82.1%	0.0%	17.9%	82.5%	0.0%	17.5%
Amer. Water Works	69.4%	0.0%	30.6%	68.5%	0.0%	31.5%
Artesian Res Corp	70.6%	0.0%	29.4%	68.5%	0.0%	31.5%
California Water	76.0%	0.0%	24.0%	71.6%	0.0%	28.4%
Essential Utilities	66.3%	0.0%	33.7%	66.1%	0.0%	33.9%
Global Water Resources Inc	73.1%	0.0%	26.9%	70.1%	0.0%	29.9%
Middlesex Water	78.8%	0.1%	21.1%	80.4%	0.1%	19.4%
SJW Group	62.3%	0.0%	37.7%	59.5%	0.0%	40.5%
York Water Co. (The)	83.7%	0.0%	16.3%	81.6%	0.0%	18.4%
Core Water Sample Average	74.1%	0.0%	25.9%	72.9%	0.0%	27.1%
Full Sample Average	73.6%	0.0%	26.4%	72.1%	0.0%	27.9%

Sources and Notes:
[1], [4]:Workpaper #1 to Schedule No. MT-4.
[2], [5]:Workpaper #2 to Schedule No. MT-4.
[3], [6]:Workpaper #3 to Schedule No. MT-4.
Values in this table may not add up exactly to 1.0 because of rounding.

Workpaper #1 to Schedule No. MT-4

Water Sample

Calculation of the Average Common Equity - Market Value Ratio

Company	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2018	5-Year Average
	[1]	[2]	[3]	[7]	[8]
Amer. States Water	82.1%	82.1%	83.9%	83.2%	82.5%
Amer. Water Works	69.4%	69.4%	74.8%	63.5%	68.5%
Artesian Res Corp	70.6%	70.6%	70.2%	73.5%	68.5%
California Water	76.0%	76.0%	76.0%	68.4%	71.6%
Essential Utilities	66.3%	66.3%	71.0%	72.9%	66.1%
Global Water Resources Inc	73.1%	73.1%	76.6%	62.2%	70.1%
Middlesex Water	78.8%	78.8%	84.6%	77.0%	80.4%
SJW Group	62.3%	62.3%	59.8%	67.8%	59.5%
York Water Co. (The)	83.7%	83.7%	81.1%	80.2%	81.6%

Sources and Notes:
[1] - [7]: Schedule No. MT-3; Panels A - I, [v].
[1]: Reflects the current capital structure.
[8]: Average of [2] - [7] with 1/2 weighting to 1Q2023 and 1Q2018 for the purposes of calculating average capital structure o
For companies without sufficient data history, Capital structure is calculated using available data.

Workpaper #2 to Schedule No. MT-4

Water Sample

Calculation of the Average Preferred Equity - Market Value Ratio

Company	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Amer. States Water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Amer. Water Works	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Artesian Res Corp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
California Water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Essential Utilities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Global Water Resources Inc	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Middlesex Water	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.3%	0.1%
SJW Group	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
York Water Co. (The)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Sources and Notes:
[1] - [7]: Schedule No. MT-3; Panels A - I, [w].
[1]: Reflects the current capital structure.
[8]: Average of [2] - [7] with 1/2 weighting to 1Q2023 and 1Q2018 for the purposes of calculating average capital structure during the period.
For companies without sufficient data history, Capital structure is calculated using available data.

Workpaper #3 to Schedule No. MT-4

Water Sample

Calculation of the Average Debt - Market Value Ratio

Company	DCF Capital Structure	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	1st Quarter, 2018	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Amer. States Water	17.9%	17.9%	16.1%	19.4%	17.2%	16.8%	16.8%	17.5%
Amer. Water Works	30.6%	30.6%	25.2%	31.3%	35.6%	34.6%	36.5%	31.5%
Artesian Res Corp	29.4%	29.4%	29.8%	32.9%	36.2%	29.3%	26.5%	31.5%
California Water	24.0%	24.0%	24.0%	33.7%	33.1%	27.4%	31.6%	28.4%
Essential Utilities	33.7%	33.7%	29.0%	37.0%	38.8%	31.0%	27.1%	33.9%
Global Water Resources Inc	26.9%	26.9%	23.4%	25.6%	37.2%	36.6%	37.8%	29.9%
Middlesex Water	21.1%	21.1%	15.3%	18.3%	22.8%	19.6%	22.7%	19.4%
SJW Group	37.7%	37.7%	40.2%	47.3%	51.4%	26.0%	32.2%	40.5%
York Water Co. (The)	16.3%	16.3%	18.9%	18.2%	19.4%	19.2%	19.8%	18.4%

Sources and Notes:
[1] - [7]: Schedule No. MT-3; Panels A - I, [x].
[1]: Reflects the current capital structure.
[8]: Average of [2] - [7] with 1/2 weighting to 1Q2023 and 1Q2018 for the purposes of calculating average capital structure during the period.
For companies without sufficient data history, Capital structure is calculated using available data.

Schedule No. MT-5

Water Sample

Estimated Growth Rates of the Water Sample

	Thomson Reuters IBES Estimate		Value Line			
Company	Long-Term Growth Rate	Number of Estimates	EPS Year 2023 Estimate	EPS Year 2026-2028 Estimate	Annualized Growth Rate	Combined Growth Rate
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	4.4%	1	2.85	3.40	4.5%	4.5%
Amer. Water Works	8.3%	1	4.75	6.10	6.5%	7.4%
Artesian Res Corp	4.0%	1	2.02	n/a	n/a	4.0%
California Water	11.7%	1	2.25	2.75	5.1%	8.4%
Essential Utilities	6.6%	1	1.85	2.35	6.2%	6.4%
Global Water Resources Inc	15.0%	1	0.25	n/a	n/a	15.0%
Middlesex Water	2.7%	1	2.70	3.00	2.7%	2.7%
SJW Group	9.8%	1	2.60	3.25	5.7%	7.8%
York Water Co. (The)	4.9%	1	1.51	n/a	n/a	4.9%

Sources and Notes:

[1] - [2]: Thomson Reuters as of March 31, 2023.

[3] - [4]: From Valueline Investment Analyzer as of March 31, 2023.

[5]: ([4] / [3]) ^ (1/4) - 1.

[6]: ([1] x [2] + [5]) / ([2] + 1).

Weighted average growth rate. If information is missing from one source, the weighted average is based solely on the other source.

Schedule No. MT-6

DCF Cost of Equity of the Water Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price	Most Recent Dividend	Quarterly Dividend Yield (t+1)	Combined Long-Term Growth Rate	Quarterly Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	$86.59	$0.40	0.46%	4.5%	1.1%	6.4%
Amer. Water Works	$140.99	$0.66	0.47%	7.4%	1.8%	9.4%
Artesian Res Corp	$53.21	$0.28	0.53%	4.0%	1.0%	6.2%
California Water	$56.60	$0.26	0.47%	8.4%	2.0%	10.4%
Essential Utilities	$42.38	$0.29	0.69%	6.4%	1.6%	9.3%
Global Water Resources Inc	$12.49	$0.02	0.21%	15.0%	3.6%	15.9%
Middlesex Water	$76.11	$0.31	0.41%	2.7%	0.7%	4.4%
SJW Group	$75.44	$0.38	0.51%	7.8%	1.9%	10.0%
York Water Co. (The)	$44.26	$0.20	0.46%	4.9%	1.2%	6.8%

Sources and Notes:
[1]: Workpaper #1 to Schedule No. MT-6.
[2]: Workpaper #2 to Schedule No. MT-6.
[3]: ([2] / [1]) x (1 + [5]).
[4]: Schedule No. MT-5, [6].
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {([3] + [5] + 1) ^ 4} - 1.

Schedule No. MT-6

DCF Cost of Equity of the Water Sample

Panel B: Multi-Stage DCF (Using Blue Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	Stock Price	Most Recent Dividend	Combined Long-Term Growth Rate	Growth Rate: Year 6	Growth Rate: Year 7	Growth Rate: Year 8	Growth Rate: Year 9	Growth Rate: Year 10	GDP Long-Term Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer. States Water	$86.59	$0.40	4.5%	4.4%	4.3%	4.2%	4.1%	4.0%	3.9%	5.9%
Amer. Water Works	$140.99	$0.66	7.4%	6.8%	6.2%	5.6%	5.1%	4.5%	3.9%	6.3%
Artesian Res Corp	$53.21	$0.28	4.0%	4.0%	4.0%	4.0%	3.9%	3.9%	3.9%	6.1%
California Water	$56.60	$0.26	8.4%	7.7%	6.9%	6.2%	5.4%	4.7%	3.9%	6.5%
Essential Utilities	$42.38	$0.29	6.4%	6.0%	5.6%	5.1%	4.7%	4.3%	3.9%	7.2%
Global Water Resources Inc	$12.49	$0.02	15.0%	13.2%	11.3%	9.5%	7.6%	5.8%	3.9%	5.6%
Middlesex Water	$76.11	$0.31	2.7%	2.9%	3.1%	3.3%	3.5%	3.7%	3.9%	5.5%
SJW Group	$75.44	$0.38	7.8%	7.1%	6.5%	5.8%	5.2%	4.5%	3.9%	6.6%
York Water Co. (The)	$44.26	$0.20	4.9%	4.7%	4.6%	4.4%	4.2%	4.1%	3.9%	6.0%

Sources and Notes:
[1]: Workpaper #1 to Schedule No. MT-6.
[2]: Workpaper #2 to Schedule No. MT-6.
[3]: Schedule No. MT-5, [6].
[4]: [3] - {([3] - [9])/ 6}.
[5]: [4] - {([3] - [9])/ 6}.
[6]: [5] - {([3] - [9])/ 6}.
[7]: [6] - {([3] - [9])/ 6}.
[8]: [7] - {([3] - [9])/ 6}.
[9]: BlueChip Economic Indicators, October 2022 This number is assumed to be the perpetual growth rate.
[10]: Workpaper #3 to Schedule No. MT-6.

Workpaper #1 to Schedule No. MT-6

Water Sample

Common Stock Prices from March 13, 2023 to March 31, 2023

Company	3/31/2023	3/30/2023	3/29/2023	3/28/2023	3/27/2023	3/24/2023	3/23/2023	3/22/2023	3/21/2023	3/20/2023	3/17/2023	3/16/2023	3/15/2023	3/14/2023	3/13/2023	Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
Amer. States Water	$88.89	$87.83	$87.19	$86.55	$86.64	$86.64	$83.81	$83.95	$85.27	$87.96	$86.74	$88.22	$87.40	$86.73	$85.02	$86.59
Amer. Water Works	$146.49	$145.89	$144.14	$141.22	$141.68	$141.84	$136.72	$136.38	$138.86	$142.56	$141.81	$142.65	$140.63	$137.67	$136.37	$140.99
Artesian Res Corp	$55.36	$54.58	$54.34	$53.82	$53.60	$53.58	$51.52	$52.01	$52.37	$53.41	$52.14	$53.40	$53.49	$52.87	$51.62	$53.21
California Water	$58.20	$57.59	$57.39	$57.25	$56.88	$56.68	$54.47	$54.82	$55.64	$57.78	$56.81	$57.53	$56.73	$56.13	$55.04	$56.60
Essential Utilities	$43.65	$43.04	$42.54	$42.05	$42.13	$42.11	$40.65	$40.96	$41.76	$42.80	$42.56	$43.08	$43.28	$42.78	$42.30	$42.38
Global Water Resources	$12.43	$12.42	$12.50	$12.45	$12.54	$12.32	$12.13	$12.36	$12.74	$12.85	$12.72	$12.59	$12.53	$12.54	$12.24	$12.49
Middlesex Water	$78.12	$77.71	$77.63	$77.25	$76.17	$77.51	$74.49	$73.95	$74.98	$76.39	$76.21	$76.82	$75.73	$75.28	$73.40	$76.11
SJW Group	$76.13	$75.79	$75.94	$75.45	$75.62	$76.00	$72.94	$72.41	$73.37	$77.18	$75.70	$76.69	$76.36	$76.43	$75.63	$75.44
York Water Co. (The)	$44.70	$44.53	$44.48	$44.36	$44.20	$44.18	$42.76	$43.10	$44.14	$44.80	$44.57	$45.08	$44.78	$44.62	$43.65	$44.26

Sources and Notes:
[1] - [15]: Bloomberg as of March 31, 2023.
[16]: Average of [1] through [15].

Workpaper #2 to Schedule No. MT-6

Water Sample

Most Recent Paid Dividends

Company	Most Recent Dividend
Amer. States Water	$0.40
Amer. Water Works	$0.66
Artesian Res Corp	$0.28
California Water	$0.26
Essential Utilities	$0.29
Global Water Resources Inc	$0.02
Middlesex Water	$0.31
SJW Group	$0.38
York Water Co. (The)	$0.20

Sources and Notes:
Bloomberg as of March 31, 2023.

Workpaper #3 to Schedule No. MT-6

DCF Cost of Equity of the Water Sample

Multi-Stage DCF (using Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Growth Rate)

Company	Amer. States Water	Amer. Water Works	Artesian Res Corp	California Water	Essential Utilities	Global Water Resources Inc	Middlesex Water	SJW Group	York Water Co. (The)
Current Dividend	$0.40	$0.66	$0.28	$0.26	$0.29	$0.02	$0.31	$0.38	$0.20
Current Stock Price	($86.59)	($140.99)	($53.21)	($56.60)	($42.38)	($12.49)	($76.11)	($75.44)	($44.26)
Dividend Q2 Estimate	$0.40	$0.67	$0.28	$0.27	$0.29	$0.03	$0.31	$0.39	$0.21
Dividend Q3 Estimate	$0.41	$0.68	$0.28	$0.27	$0.30	$0.03	$0.32	$0.39	$0.21
Dividend Q4 Estimate	$0.41	$0.69	$0.29	$0.28	$0.30	$0.03	$0.32	$0.40	$0.21
Dividend Q1 Estimate	$0.42	$0.70	$0.29	$0.28	$0.31	$0.03	$0.32	$0.41	$0.21
Dividend Q2 Estimate	$0.42	$0.72	$0.29	$0.29	$0.31	$0.03	$0.32	$0.42	$0.22
Dividend Q3 Estimate	$0.42	$0.73	$0.30	$0.29	$0.31	$0.03	$0.33	$0.43	$0.22
Dividend Q4 Estimate	$0.43	$0.74	$0.30	$0.30	$0.32	$0.03	$0.33	$0.43	$0.22
Dividend Q1 Estimate	$0.43	$0.76	$0.30	$0.31	$0.32	$0.03	$0.33	$0.44	$0.22
Dividend Q2 Estimate	$0.44	$0.77	$0.30	$0.31	$0.33	$0.03	$0.33	$0.45	$0.23
Dividend Q3 Estimate	$0.44	$0.78	$0.31	$0.32	$0.34	$0.04	$0.33	$0.46	$0.23
Dividend Q4 Estimate	$0.45	$0.80	$0.31	$0.32	$0.34	$0.04	$0.34	$0.47	$0.23
Dividend Q1 Estimate	$0.45	$0.81	$0.31	$0.33	$0.35	$0.04	$0.34	$0.48	$0.23
Dividend Q2 Estimate	$0.46	$0.83	$0.32	$0.34	$0.35	$0.04	$0.34	$0.48	$0.24
Dividend Q3 Estimate	$0.46	$0.84	$0.32	$0.35	$0.36	$0.04	$0.34	$0.49	$0.24
Dividend Q4 Estimate	$0.47	$0.86	$0.32	$0.35	$0.36	$0.04	$0.35	$0.50	$0.24
Dividend Q1 Estimate	$0.47	$0.87	$0.33	$0.36	$0.37	$0.04	$0.35	$0.51	$0.25
Dividend Q2 Estimate	$0.48	$0.89	$0.33	$0.37	$0.37	$0.04	$0.35	$0.52	$0.25
Dividend Q3 Estimate	$0.48	$0.90	$0.33	$0.37	$0.38	$0.05	$0.35	$0.53	$0.25
Dividend Q4 Estimate	$0.49	$0.92	$0.34	$0.38	$0.39	$0.05	$0.35	$0.54	$0.25
Dividend Q1 Estimate	$0.49	$0.93	$0.34	$0.39	$0.39	$0.05	$0.36	$0.55	$0.26
Dividend Q2 Estimate	$0.50	$0.95	$0.34	$0.40	$0.40	$0.05	$0.36	$0.56	$0.26
Dividend Q3 Estimate	$0.50	$0.97	$0.35	$0.40	$0.40	$0.05	$0.36	$0.57	$0.26
Dividend Q4 Estimate	$0.51	$0.98	$0.35	$0.41	$0.41	$0.05	$0.36	$0.58	$0.27
Dividend Q1 Estimate	$0.52	$1.00	$0.35	$0.42	$0.41	$0.06	$0.37	$0.59	$0.27
Dividend Q2 Estimate	$0.52	$1.01	$0.36	$0.43	$0.42	$0.06	$0.37	$0.60	$0.27
Dividend Q3 Estimate	$0.53	$1.03	$0.36	$0.43	$0.43	$0.06	$0.37	$0.61	$0.28
Dividend Q4 Estimate	$0.53	$1.04	$0.36	$0.44	$0.43	$0.06	$0.38	$0.62	$0.28
Dividend Q1 Estimate	$0.54	$1.06	$0.37	$0.45	$0.44	$0.06	$0.38	$0.63	$0.28
Dividend Q2 Estimate	$0.54	$1.07	$0.37	$0.46	$0.44	$0.06	$0.38	$0.64	$0.29
Dividend Q3 Estimate	$0.55	$1.09	$0.37	$0.46	$0.45	$0.07	$0.38	$0.65	$0.29
Dividend Q4 Estimate	$0.55	$1.10	$0.38	$0.47	$0.45	$0.07	$0.39	$0.66	$0.29
Dividend Q1 Estimate	$0.56	$1.12	$0.38	$0.48	$0.46	$0.07	$0.39	$0.67	$0.29
Dividend Q2 Estimate	$0.57	$1.13	$0.38	$0.48	$0.47	$0.07	$0.39	$0.68	$0.30
Dividend Q3 Estimate	$0.57	$1.15	$0.39	$0.49	$0.47	$0.07	$0.40	$0.68	$0.30
Dividend Q4 Estimate	$0.58	$1.16	$0.39	$0.50	$0.48	$0.07	$0.40	$0.69	$0.30
Dividend Q1 Estimate	$0.58	$1.18	$0.40	$0.50	$0.48	$0.07	$0.40	$0.70	$0.31
Dividend Q2 Estimate	$0.59	$1.19	$0.40	$0.51	$0.49	$0.08	$0.41	$0.71	$0.31
Dividend Q3 Estimate	$0.59	$1.20	$0.40	$0.51	$0.49	$0.08	$0.41	$0.72	$0.31
Dividend Q4 Estimate	$0.60	$1.22	$0.41	$0.52	$0.50	$0.08	$0.42	$0.73	$0.32
Dividend Q1 Estimate	$0.61	$1.23	$0.41	$0.53	$0.50	$0.08	$0.42	$0.73	$0.32

Workpaper #3 to Schedule No. MT-6

DCF Cost of Equity of the Water Sample

Multi-Stage DCF (using Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Growth Rate)

Company	Amer. States Water	Amer. Water Works	Artesian Res Corp	California Water	Essential Utilities	Global Water Resources Inc	Middlesex Water	SJW Group	York Water Co. (The)
Year 10 Stock Price	$129.13	$214.00	$79.22	$86.50	$64.42	$19.27	$112.51	$115.07	$66.16
Trial COE: Quarterly Rate	1.4%	1.5%	1.5%	1.6%	1.8%	1.4%	1.3%	1.6%	1.5%
Trial COE: Annual Rate	5.9%	6.3%	6.1%	6.5%	7.2%	5.6%	5.5%	6.6%	6.0%
Cost of Equity	5.9%	6.3%	6.1%	6.5%	7.2%	5.6%	5.5%	6.6%	5.9%
(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:
All Growth Rate Estimates: Schedule No. MT-6; Panel B.
Stock Prices and Dividends are from Bloomberg as of March 31, 2023.
1. See Workpaper #1 to Schedule No. MT-6 for the average closing stock price obtained from Bloomberg.
2. See Workpaper #2 to Schedule No. MT-6 for the for the quarterly dividend obtained from Bloomberg.
3. The Blue Chip Economic Indicator Long-Term GDP Growth Rate is used to calculate the Year 10 Stock Price.

Year 10 Stock Price = {(the Dividend Year 2028 Q4 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/4) x (1 + Quarterly Rate))} /
{(Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Schedule No. MT-7

Overall After-Tax DCF Cost of Capital of the Water Sample

Panel A: Simple DCF Method (Quarterly)

Company	1st Quarter, 2023 S&P Bond Rating	1st Quarter, 2023 Preferred Equity Rating	DCF Cost of Equity	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	Great Oaks's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer. States Water	A	-	6.4%	0.82	-	0.00	5.3%	0.18	28.0%	5.9%
Amer. Water Works	A	-	9.4%	0.69	-	0.00	5.3%	0.31	28.0%	7.7%
Artesian Res Corp	A	-	~~6.2%~~	0.71	-	0.00	5.3%	0.29	28.0%	~~5.5%~~
California Water	A	-	10.4%	0.76	-	0.00	5.3%	0.24	28.0%	8.8%
Essential Utilities	A	-	9.3%	0.66	-	0.00	5.3%	0.34	28.0%	7.5%
Global Water Resources Inc	A	-	15.9%	0.73	-	0.00	5.3%	0.27	28.0%	12.7%
Middlesex Water	A	A	~~4.4%~~	0.79	5.3%	0.00	5.3%	0.21	28.0%	~~4.3%~~
SJW Group	A	-	10.0%	0.62	-	0.00	5.3%	0.38	28.0%	7.6%
York Water Co. (The)	A	-	6.8%	0.84	-	0.00	5.3%	0.16	28.0%	6.3%
Simple Core Water Sample Average			8.7%	73.3%	n/a	0.0%	5.3%	26.7%	28.0%	7.3%
Simple Full Sample Average			9.7%	73.3%	n/a	0.0%	5.3%	26.7%	28.0%	8.1%

Sources and Notes:
[1]: Bloomberg as of March 31, 2023.
[2]: Preferred ratings were assumed equal to debt rating
[3]: Schedule No. MT-6; Panel A, [6].
[4]: Schedule No. MT-4, [1].
[5]: Workpaper #2 to Schedule No. MT-11, Panel C.
[6]: Schedule No. MT-4, [2].
[7]: Workpaper #2 to Schedule No. MT-11, Panel B.
[8]: Schedule No. MT-4, [3].
[9]: Provided by Great Oaks.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 100 basis points

Schedule No. MT-7

Overall After-Tax DCF Cost of Capital of the Water Sample

Panel B: Multi-Stage DCF (Using Blue Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	1st Quarter, 2023 S&P Bond Rating	1st Quarter, 2023 Preferred Equity Rating	DCF Cost of Equity	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	Great Oaks's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer. States Water	A	-	~~5.9%~~	0.82	-	0.00	5.3%	0.18	28.0%	~~5.5%~~
Amer. Water Works	A	-	6.3%	0.69	-	0.00	5.3%	0.31	28.0%	5.6%
Artesian Res Corp	A	-	~~6.1%~~	0.71	-	0.00	5.3%	0.29	28.0%	~~5.4%~~
California Water	A	-	6.5%	0.76	-	0.00	5.3%	0.24	28.0%	5.9%
Essential Utilities	A	-	7.2%	0.66	-	0.00	5.3%	0.34	28.0%	6.1%
Global Water Resources Inc	A	-	~~5.6%~~	0.73	-	0.00	5.3%	0.27	28.0%	~~5.1%~~
Middlesex Water	A	A	~~5.5%~~	0.79	5.3%	0.00	5.3%	0.21	28.0%	~~5.1%~~
SJW Group	A	-	6.6%	0.62	-	0.00	5.3%	0.38	28.0%	5.6%
York Water Co. (The)	A	-	~~6.0%~~	0.84	-	0.00	5.3%	0.16	28.0%	~~5.6%~~
Multi-Stage Core Water Sample Average			6.7%	68.5%	n/a	0.0%	5.3%	31.5%	28.0%	5.8%
Simple Full Sample Average			6.7%	68.5%	n/a	0.0%	5.3%	31.5%	28.0%	5.8%

Sources and Notes:

[1]: Bloomberg as of March 31, 2023.
[2]: Preferred ratings were assumed equal to debt ratinរ
[3]: Schedule No. MT-6, Panel B, [10].
[4]: Schedule No. MT-4, [1].
[5]: Workpaper #2 to Schedule No. MT-11, Panel C.
[6]: Schedule No. MT-4, [2].
[7]: Workpaper #2 to Schedule No. MT-11, Panel B.
[8]: Schedule No. MT-4, [3].
[9]: Provided by Great Oaks.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 100 basis points

Schedule No. MT-8

DCF Cost of Equity at Great Oaks's Proposed Capital Structure

Water Sample

	Overall After - Tax Cost of Capital [1]	Great Oaks's Representative Regulatory % Debt [2]	Representative Cost of BBB Rated Utility Debt [3]	Great Oaks's Representative Income Tax Rate [4]	Great Oaks's Representative Regulatory % Equity [5]	Estimated Return on Equity [6]
Core Water Sample						
Simple DCF Quarterly	7.3%	30.0%	5.7%	28.0%	70.0%	8.7%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	5.8%	30.0%	5.7%	28.0%	70.0%	6.5%
Full Sample						
Simple DCF Quarterly	8.1%	30.0%	5.7%	28.0%	70.0%	9.8%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	5.8%	30.0%	5.7%	28.0%	70.0%	6.5%

Sources and Notes:
[1]: Schedule No. MT-7; Panels A-B, [10].
[2]: Provided by Great Oaks.
[3]: Based on a BBB rating. Yield from Bloomberg as of March 31, 2023.
[4]: Provided by Great Oaks.
[5]: Provided by Great Oaks.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Schedule No. MT-9 Risk-Free Rates

BCEI Forecast of 10 year U.S. Treasury Yield	**[a]**	**3.30%**
Long-run Average of 20 year U.S. Treasury Yield	[b]	4.73%
Long-run Average of 10 year U.S. Treasury Yield	[c]	4.26%
Maturity Premium	**[d] = [b] - [c]**	**0.50%**
Base Projection of 20 year U.S. Treasury Yield	**[e] = [a] + [d]**	**3.80%**

Sources and Notes:
[a]: Blue Chip Economic Indicators, March 2023, p. 14. Projection of 2025 Yield.
[b], [c]: Bloomberg as of 3/31/2023, see Workpaper #1 to Schedule No. MT-9.

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
1/31/1990	8.210	8.240
2/28/1990	8.470	8.490
3/31/1990	8.590	8.580
4/30/1990	8.790	8.770
5/31/1990	8.760	8.740
6/30/1990	8.480	8.470
7/31/1990	8.470	8.480
8/31/1990	8.750	8.810
9/30/1990	8.890	8.960
10/31/1990	8.720	8.790
11/30/1990	8.390	8.470
12/31/1990	8.080	8.160
1/31/1991	8.090	8.190
2/28/1991	7.850	7.950
3/31/1991	8.110	8.200
4/30/1991	8.040	8.130
5/31/1991	8.070	8.170
6/30/1991	8.280	8.380
7/31/1991	8.270	8.370
8/31/1991	7.900	8.030
9/30/1991	7.650	7.800
10/31/1991	7.530	7.730
11/30/1991	7.420	7.670
12/31/1991	7.090	7.390
1/31/1992	7.030	7.300
2/29/1992	7.340	7.590
3/31/1992	7.540	7.760
4/30/1992	7.480	7.720
5/31/1992	7.390	7.650
6/30/1992	7.260	7.560
7/31/1992	6.840	7.240
8/31/1992	6.590	7.000
9/30/1992	6.420	6.880
10/31/1992	6.590	7.070
11/30/1992	6.870	7.240
12/31/1992	6.770	7.100
1/31/1993	6.600	6.980
2/28/1993	6.260	6.670
3/31/1993	5.980	6.400
4/30/1993	5.970	6.410
5/31/1993	6.040	6.480

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
6/30/1993	5.960	6.390
7/31/1993	5.810	6.230
8/31/1993	5.680	6.000
9/30/1993	5.360	5.680
10/31/1993	5.330	6.070
11/30/1993	5.720	6.380
12/31/1993	5.770	6.400
1/31/1994	5.750	6.390
2/28/1994	5.970	6.570
3/31/1994	6.480	7.000
4/30/1994	6.970	7.400
5/31/1994	7.180	7.540
6/30/1994	7.100	7.510
7/31/1994	7.300	7.670
8/31/1994	7.240	7.620
9/30/1994	7.460	7.870
10/31/1994	7.740	8.080
11/30/1994	7.960	8.200
12/31/1994	7.810	7.990
1/31/1995	7.780	7.970
2/28/1995	7.470	7.730
3/31/1995	7.200	7.570
4/30/1995	7.060	7.450
5/31/1995	6.630	7.010
6/30/1995	6.170	6.590
7/31/1995	6.280	6.740
8/31/1995	6.490	6.920
9/30/1995	6.200	6.650
10/31/1995	6.040	6.450
11/30/1995	5.930	6.330
12/31/1995	5.710	6.120
1/31/1996	5.650	6.110
2/29/1996	5.810	6.300
3/31/1996	6.270	6.740
4/30/1996	6.510	6.980
5/31/1996	6.740	7.110
6/30/1996	6.910	7.220
7/31/1996	6.870	7.140
8/31/1996	6.640	6.970
9/30/1996	6.830	7.170
10/31/1996	6.530	6.900

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
11/30/1996	6.200	6.580
12/31/1996	6.300	6.650
1/31/1997	6.580	6.910
2/28/1997	6.420	6.770
3/31/1997	6.690	7.050
4/30/1997	6.890	7.200
5/31/1997	6.710	7.020
6/30/1997	6.490	6.840
7/31/1997	6.220	6.560
8/31/1997	6.300	6.650
9/30/1997	6.210	6.560
10/31/1997	6.030	6.380
11/30/1997	5.880	6.200
12/31/1997	5.810	6.070
1/31/1998	5.540	5.880
2/28/1998	5.570	5.960
3/31/1998	5.650	6.010
4/30/1998	5.640	6.000
5/31/1998	5.650	6.010
6/30/1998	5.500	5.800
7/31/1998	5.460	5.780
8/31/1998	5.340	5.660
9/30/1998	4.810	5.380
10/31/1998	4.530	5.300
11/30/1998	4.830	5.480
12/31/1998	4.650	5.360
1/31/1999	4.720	5.450
2/28/1999	5.000	5.660
3/31/1999	5.230	5.870
4/30/1999	5.180	5.820
5/31/1999	5.540	6.080
6/30/1999	5.900	6.360
7/31/1999	5.790	6.280
8/31/1999	5.940	6.430
9/30/1999	5.920	6.500
10/31/1999	6.110	6.660
11/30/1999	6.030	6.480
12/31/1999	6.280	6.690
1/31/2000	6.660	6.860
2/29/2000	6.520	6.540
3/31/2000	6.260	6.380

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
4/30/2000	5.990	6.180
5/31/2000	6.440	6.550
6/30/2000	6.100	6.280
7/31/2000	6.050	6.200
8/31/2000	5.830	6.020
9/30/2000	5.800	6.090
10/31/2000	5.740	6.040
11/30/2000	5.720	5.980
12/31/2000	5.240	5.640
1/31/2001	5.160	5.650
2/28/2001	5.100	5.620
3/31/2001	4.890	5.490
4/30/2001	5.140	5.780
5/31/2001	5.390	5.920
6/30/2001	5.280	5.820
7/31/2001	5.240	5.750
8/31/2001	4.970	5.580
9/30/2001	4.730	5.530
10/31/2001	4.570	5.340
11/30/2001	4.650	5.330
12/31/2001	5.090	5.760
1/31/2002	5.040	5.690
2/28/2002	4.910	5.610
3/31/2002	5.280	5.930
4/30/2002	5.210	5.850
5/31/2002	5.160	5.810
6/30/2002	4.930	5.650
7/31/2002	4.650	5.510
8/31/2002	4.260	5.190
9/30/2002	3.870	4.870
10/31/2002	3.940	5.000
11/30/2002	4.050	5.040
12/31/2002	4.030	5.010
1/31/2003	4.050	5.020
2/28/2003	3.900	4.870
3/31/2003	3.810	4.820
4/30/2003	3.960	4.910
5/31/2003	3.570	4.520
6/30/2003	3.330	4.340
7/31/2003	3.980	4.920
8/31/2003	4.450	5.390

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
9/30/2003	4.270	5.210
10/31/2003	4.290	5.210
11/30/2003	4.300	5.170
12/31/2003	4.270	5.110
1/31/2004	4.150	5.010
2/29/2004	4.080	4.940
3/31/2004	3.830	4.720
4/30/2004	4.350	5.160
5/31/2004	4.720	5.460
6/30/2004	4.730	5.450
7/31/2004	4.500	5.240
8/31/2004	4.280	5.070
9/30/2004	4.130	4.890
10/31/2004	4.100	4.850
11/30/2004	4.190	4.890
12/31/2004	4.230	4.880
1/31/2005	4.220	4.770
2/28/2005	4.170	4.610
3/31/2005	4.500	4.890
4/30/2005	4.340	4.750
5/31/2005	4.140	4.560
6/30/2005	4.000	4.350
7/31/2005	4.180	4.480
8/31/2005	4.260	4.530
9/30/2005	4.200	4.510
10/31/2005	4.460	4.740
11/30/2005	4.540	4.830
12/31/2005	4.470	4.730
1/31/2006	4.420	4.650
2/28/2006	4.570	4.730
3/31/2006	4.720	4.910
4/30/2006	4.990	5.220
5/31/2006	5.110	5.350
6/30/2006	5.110	5.290
7/31/2006	5.090	5.250
8/31/2006	4.880	5.080
9/30/2006	4.720	4.930
10/31/2006	4.730	4.940
11/30/2006	4.600	4.780
12/31/2006	4.560	4.780
1/31/2007	4.760	4.950

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
2/28/2007	4.720	4.930
3/31/2007	4.560	4.810
4/30/2007	4.690	4.950
5/31/2007	4.750	4.980
6/30/2007	5.100	5.290
7/31/2007	5.000	5.190
8/31/2007	4.670	5.000
9/30/2007	4.520	4.840
10/31/2007	4.530	4.830
11/30/2007	4.150	4.560
12/31/2007	4.100	4.570
1/31/2008	3.740	4.350
2/29/2008	3.740	4.490
3/31/2008	3.510	4.360
4/30/2008	3.670	4.440
5/31/2008	3.880	4.600
6/30/2008	4.100	4.740
7/31/2008	4.010	4.620
8/31/2008	3.890	4.530
9/30/2008	3.690	4.320
10/31/2008	3.810	4.450
11/30/2008	3.530	4.270
12/31/2008	2.420	3.180
1/31/2009	2.520	3.460
2/28/2009	2.870	3.830
3/31/2009	2.820	3.780
4/30/2009	2.930	3.840
5/31/2009	3.290	4.220
6/30/2009	3.720	4.510
7/31/2009	3.560	4.380
8/31/2009	3.590	4.330
9/30/2009	3.400	4.140
10/31/2009	3.390	4.160
11/30/2009	3.400	4.240
12/31/2009	3.590	4.400
1/31/2010	3.730	4.500
2/28/2010	3.690	4.480
3/31/2010	3.730	4.490
4/30/2010	3.850	4.530
5/31/2010	3.420	4.110
6/30/2010	3.200	3.950

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
7/31/2010	3.010	3.800
8/31/2010	2.700	3.520
9/30/2010	2.650	3.470
10/31/2010	2.540	3.520
11/30/2010	2.760	3.820
12/31/2010	3.290	4.170
1/31/2011	3.390	4.280
2/28/2011	3.580	4.420
3/31/2011	3.410	4.270
4/30/2011	3.450	4.280
5/31/2011	3.170	4.010
6/30/2011	3.000	3.910
7/31/2011	3.000	3.950
8/31/2011	2.300	3.240
9/30/2011	1.980	2.830
10/31/2011	2.150	2.870
11/30/2011	2.010	2.720
12/31/2011	1.980	2.670
1/31/2012	1.970	2.700
2/29/2012	1.970	2.750
3/31/2012	2.170	2.940
4/30/2012	2.050	2.820
5/31/2012	1.800	2.530
6/30/2012	1.620	2.310
7/31/2012	1.530	2.220
8/31/2012	1.680	2.400
9/30/2012	1.720	2.490
10/31/2012	1.750	2.510
11/30/2012	1.650	2.390
12/31/2012	1.720	2.470
1/31/2013	1.910	2.680
2/28/2013	1.980	2.780
3/31/2013	1.960	2.780
4/30/2013	1.760	2.550
5/31/2013	1.930	2.730
6/30/2013	2.300	3.070
7/31/2013	2.580	3.310
8/31/2013	2.740	3.490
9/30/2013	2.810	3.530
10/31/2013	2.620	3.380
11/30/2013	2.720	3.500

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
12/31/2013	2.900	3.630
1/31/2014	2.860	3.520
2/28/2014	2.710	3.380
3/31/2014	2.720	3.350
4/30/2014	2.710	3.270
5/31/2014	2.560	3.120
6/30/2014	2.600	3.150
7/31/2014	2.540	3.070
8/31/2014	2.420	2.940
9/30/2014	2.530	3.010
10/31/2014	2.300	2.770
11/30/2014	2.330	2.760
12/31/2014	2.210	2.550
1/31/2015	1.880	2.200
2/28/2015	1.980	2.340
3/31/2015	2.040	2.410
4/30/2015	1.940	2.330
5/31/2015	2.200	2.690
6/30/2015	2.360	2.850
7/31/2015	2.320	2.770
8/31/2015	2.170	2.550
9/30/2015	2.170	2.620
10/31/2015	2.070	2.500
11/30/2015	2.260	2.690
12/31/2015	2.240	2.610
1/31/2016	2.090	2.490
2/29/2016	1.780	2.200
3/31/2016	1.890	2.280
4/30/2016	1.810	2.210
5/31/2016	1.810	2.220
6/30/2016	1.640	2.020
7/31/2016	1.500	1.820
8/31/2016	1.560	1.890
9/30/2016	1.630	2.020
10/31/2016	1.760	2.170
11/30/2016	2.140	2.540
12/31/2016	2.490	2.840
1/31/2017	2.430	2.750
2/28/2017	2.420	2.760
3/31/2017	2.480	2.830
4/30/2017	2.300	2.670

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
5/31/2017	2.300	2.700
6/30/2017	2.190	2.540
7/31/2017	2.320	2.650
8/31/2017	2.210	2.550
9/30/2017	2.200	2.530
10/31/2017	2.360	2.650
11/30/2017	2.350	2.600
12/31/2017	2.400	2.600
1/31/2018	2.580	2.730
2/28/2018	2.860	3.020
3/31/2018	2.840	2.970
4/30/2018	2.870	2.960
5/31/2018	2.980	3.050
6/30/2018	2.910	2.980
7/31/2018	2.890	2.940
8/31/2018	2.890	2.970
9/30/2018	3.000	3.080
10/31/2018	3.150	3.270
11/30/2018	3.120	3.270
12/31/2018	2.830	2.980
1/31/2019	2.710	2.890
2/28/2019	2.680	2.870
3/31/2019	2.570	2.800
4/30/2019	2.530	2.760
5/31/2019	2.400	2.630
6/30/2019	2.070	2.360
7/31/2019	2.060	2.360
8/31/2019	1.630	1.910
9/30/2019	1.700	1.970
10/31/2019	1.710	2.000
11/30/2019	1.810	2.130
12/31/2019	1.860	2.160
1/31/2020	1.760	2.070
2/29/2020	1.500	1.810
3/31/2020	0.870	1.260
4/30/2020	0.660	1.060
5/31/2020	0.670	1.120
6/30/2020	0.730	1.270
7/31/2020	0.620	1.090
8/31/2020	0.650	1.140

Workpaper #1 to Schedule No. MT-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
9/30/2020	0.680	1.210
10/31/2020	0.790	1.340
11/30/2020	0.870	1.400
12/31/2020	0.930	1.470
1/31/2021	1.080	1.630
2/28/2021	1.260	1.880
3/31/2021	1.610	2.240
4/30/2021	1.640	2.200
5/31/2021	1.620	2.220
6/30/2021	1.520	2.090
7/31/2021	1.320	1.870
8/31/2021	1.280	1.830
9/30/2021	1.370	1.870
10/31/2021	1.580	2.030
11/30/2021	1.560	1.970
12/31/2021	1.470	1.900
1/31/2022	1.760	2.150
2/28/2022	1.930	2.310
3/31/2022	2.130	2.510
4/30/2022	2.750	2.990
5/31/2022	2.900	3.260
6/30/2022	3.140	3.480
7/31/2022	2.900	3.350
8/31/2022	2.900	3.350
9/30/2022	3.520	3.820
10/31/2022	3.980	4.280
11/30/2022	3.890	4.220
12/31/2022	3.620	3.870
1/31/2023	3.530	3.810
2/28/2023	3.750	3.950
3/31/2023	3.660	3.940

Schedule No. MT-10

Risk Positioning Cost of Equity of the Water Sample (Using Value Line Betas)

Panel A: Scenario 1 - Long-Term Risk Free Rate of 3.80%, Long-Term Market Risk Premium of 7.20%

Company	Long-Term Risk-Free Rate	Value Line Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Amer. States Water	3.80%	0.70	7.20%	8.8%	9.3%
Amer. Water Works	3.80%	0.90	7.20%	10.3%	10.4%
Artesian Res Corp	3.80%	0.70	7.20%	8.8%	9.3%
California Water	3.80%	0.70	7.20%	8.8%	9.3%
Essential Utilities	3.80%	0.95	7.20%	10.6%	10.7%
Global Water Resources Inc	3.80%	0.80	7.20%	9.6%	9.9%
Middlesex Water	3.80%	0.75	7.20%	9.2%	9.6%
SJW Group	3.80%	0.80	7.20%	9.6%	9.9%
York Water Co. (The)	3.80%	0.80	7.20%	9.6%	9.9%

Sources and Notes:
[1], [3]: Tolleth Direct Testimony.
[2]: From Valueline Investment Analyzer as of March 31, 2023.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. MT-10

Risk Positioning Cost of Equity of the Water Sample (Using Value Line Betas)

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.90%, Long-Term Market Risk Premium of 5.50%

Company	Long-Term Risk-Free Rate	Value Line Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Amer. States Water	3.90%	0.70	5.50%	7.8%	8.2%
Amer. Water Works	3.90%	0.90	5.50%	8.9%	9.0%
Artesian Res Corp	3.90%	0.70	5.50%	7.8%	8.2%
California Water	3.90%	0.70	5.50%	7.8%	8.2%
Essential Utilities	3.90%	0.95	5.50%	9.1%	9.2%
Global Water Resources Inc	3.90%	0.80	5.50%	8.3%	8.6%
Middlesex Water	3.90%	0.75	5.50%	8.0%	8.4%
SJW Group	3.90%	0.80	5.50%	8.3%	8.6%
York Water Co. (The)	3.90%	0.80	5.50%	8.3%	8.6%

Sources and Notes:
[1], [3]: Tolleth Direct Testimony.
[2]: From Valueline Investment Analyzer as of March 31, 2023.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Workpaper # 1 to Schedule No. MT-10

Full Sample

Value Line Betas

Company	Value Line Betas
	[1]
Amer. States Water	0.70
Amer. Water Works	0.90
Artesian Res Corp	0.70
California Water	0.70
Essential Utilities	0.95
Global Water Resources Inc	0.80
Middlesex Water	0.75
SJW Group	0.80
York Water Co. (The)	0.80
Core Water Sample Average	0.80
Full Sample Average	0.79

Sources and Notes:
[1]: From Valueline Investment Analyzer as of March 31, 2023.

Schedule No. MT-11

Overall After-Tax Risk Positioning Cost of Capital of the Water Sample (Using Value Line Betas)

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 3.80%, Long-Term Market Risk Premium of 7.20%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	5-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	5-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	5-Year Average Debt to Market Value Ratio	Great Oaks's Representative Income Tax Rate	Overall After-Tax Cost of Capital (CAPM)	Overall After-Tax Cost of Capital (ECAPM 1.5%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer. States Water	8.8%	9.3%	82.5%	-	0.0%	5.3%	17.5%	28.0%	8.0%	8.3%
Amer. Water Works	10.3%	10.4%	68.5%	-	0.0%	5.3%	31.5%	28.0%	8.3%	8.4%
Artesian Res Corp	8.8%	9.3%	68.5%	-	0.0%	5.3%	31.5%	28.0%	7.3%	7.6%
California Water	8.8%	9.3%	71.6%	-	0.0%	5.3%	28.4%	28.0%	7.4%	7.7%
Essential Utilities	10.6%	10.7%	66.1%	-	0.0%	5.3%	33.9%	28.0%	8.3%	8.4%
Global Water Resources Inc	9.6%	9.9%	70.1%	-	0.0%	5.3%	29.9%	28.0%	7.8%	8.1%
Middlesex Water	9.2%	9.6%	80.4%	5.3%	0.1%	5.3%	19.4%	28.0%	8.2%	8.5%
SJW Group	9.6%	9.9%	59.5%	-	0.0%	5.3%	40.5%	28.0%	7.2%	7.4%
York Water Co. (The)	9.6%	9.9%	81.6%	-	0.0%	5.3%	18.4%	28.0%	8.5%	8.8%
Core Water Sample Average	9.6%	9.9%	72.9%	5.3%	0.0%	5.3%	27.1%	28.0%	8.0%	8.2%
Full Sample Average	9.5%	9.8%	72.1%	5.3%	0.0%	5.3%	27.9%	28.0%	7.9%	8.1%

Sources and Notes:
[1]: Schedule No. MT-10; Panel A, [4].
[2]: Schedule No. MT-10; Panel A, [5].
[3]: Schedule No. MT-4, [4].
[4]: Workpaper #2 to Schedule No. MT-11, Panel C.
[5]: Schedule No. MT-4, [5].
[6]: Workpaper #2 to Schedule No. MT-11, Panel B.
[7]: Schedule No. MT-4, [6].
[8]: Provided by Great Oaks.
[9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])

Schedule No. MT-11

Overall After-Tax Risk Positioning Cost of Capital of the Water Sample (Using Value Line Betas)

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 3.90%, Long-Term Market Risk Premium of 5.50%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	5-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	5-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	5-Year Average Debt to Market Value Ratio	Great Oaks's Representative Income Tax Rate	Overall After-Tax Cost of Capital (CAPM)	Overall After-Tax Cost of Capital (ECAPM 1.5%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer. States Water	7.8%	8.2%	82.5%	-	0.0%	5.3%	17.5%	28.0%	7.1%	7.4%
Amer. Water Works	8.9%	9.0%	68.5%	-	0.0%	5.3%	31.5%	28.0%	7.3%	7.4%
Artesian Res Corp	7.8%	8.2%	68.5%	-	0.0%	5.3%	31.5%	28.0%	6.5%	6.8%
California Water	7.8%	8.2%	71.6%	-	0.0%	5.3%	28.4%	28.0%	6.6%	7.0%
Essential Utilities	9.1%	9.2%	66.1%	-	0.0%	5.3%	33.9%	28.0%	7.3%	7.4%
Global Water Resources Inc	8.3%	8.6%	70.1%	-	0.0%	5.3%	29.9%	28.0%	7.0%	7.2%
Middlesex Water	8.0%	8.4%	80.4%	5.3%	0.1%	5.3%	19.4%	28.0%	7.2%	7.5%
SJW Group	8.3%	8.6%	59.5%	-	0.0%	5.3%	40.5%	28.0%	6.5%	6.7%
York Water Co. (The)	8.3%	8.6%	81.6%	-	0.0%	5.3%	18.4%	28.0%	7.5%	7.7%
Core Water Sample Average	8.3%	8.6%	72.9%	5.3%	0.0%	5.3%	27.1%	28.0%	7.1%	7.3%
Full Sample Average	8.2%	8.6%	72.1%	5.3%	0.0%	5.3%	27.9%	28.0%	7.0%	7.2%

Sources and Notes:
[1]: Schedule No. MT-10; Panel B, [4].
[2]: Schedule No. MT-10; Panel B, [5].
[3]: Schedule No. MT-4, [4].
[4]: Workpaper #2 to Schedule No. MT-11, Panel C.
[5]: Schedule No. MT-4, [5].
[6]: Workpaper #2 to Schedule No. MT-11, Panel B.
[7]: Schedule No. MT-4, [6].
[8]: Provided by Great Oaks.
[9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])

Workpaper #1 to Schedule No. MT-11

Water Sample

Panel A: Rating to Yield Conversion

Rating	Bond Yield	Preferred Yield
AA	5.1%	5.1%
A	5.3%	5.3%
BBB	5.7%	5.7%

Sources and Notes:
AA estimated as A - 0.5 *(BBB-A).
Bond Yields from Bloomberg as of March 31, 2023.
Preferred Yields from matching Bloomberg bond yields as of Mar 31, 2023.

Workpaper #1 to Schedule No. MT-11

Water Sample

Panel B: Bond Rating Summary

Company	3/31/2023	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	A+	A+	A+	A+	A+	A+
Amer. Water Works	A	A	A	A	A	A
Artesian Res Corp	A	A	A	A	A	A
California Water	A	A	A	A	A	A
Essential Utilities	A	A	A	A	A	A
Global Water Resources Inc	A	A	A	A	A	A
Middlesex Water	A	A	A	A	A	A
SJW Group	A-	A-	A-	A-	A-	A-
York Water Co. (The)	A-	A-	A-	A-	A-	A-

Sources and Notes:
[1] - [6]: Bloomberg as of March 31, 2023.
Note: [3] - [6] Essential Utilities & SJW Group utilize [2] for their value because of a lack of historical ratings.

Workpaper #1 to Schedule No. MT-11

Water Sample

Panel C: Preferred Equity Rating Summary

Company	3/31/2023	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	-	-	-	-	-	-
Amer. Water Works	-	-	-	-	-	-
Artesian Res Corp	-	-	-	-	-	-
California Water	-	-	-	-	-	-
Essential Utilities	-	-	-	-	-	-
Global Water Resources Inc	-	-	-	-	-	-
Middlesex Water	A	A	A	A	A	A
SJW Group	-	-	-	-	-	-
York Water Co. (The)	-	-	-	-	-	-

Sources and Notes:

[1] - [6]: Preferred equity ratings are assumed equal to the company's bond ratings reported in Workpaper #1 to Schedule No. MT-11, Panel B.

Workpaper #2 to Schedule No. MT-11

Water Sample

Panel A: 15-Day Average Utility Bond Yields and Preferred Yields

Date	AA Rated Utility	A Rated Utility	BBB Rated Utility	AA Preferred	A Preferred	BBB Preferred
	[1]	[2]	[3]	[4]	[5]	[6]
3/31/2023	5.07	5.21	5.49	5.07	5.21	5.49
3/30/2023	5.19	5.32	5.57	5.19	5.32	5.57
3/29/2023	5.20	5.36	5.68	5.20	5.36	5.68
3/28/2023	5.24	5.38	5.68	5.24	5.38	5.68
3/27/2023	5.22	5.39	5.74	5.22	5.39	5.74
3/24/2023	5.07	5.28	5.71	5.07	5.28	5.71
3/23/2023	5.08	5.30	5.74	5.08	5.30	5.74
3/22/2023	5.09	5.28	5.64	5.09	5.28	5.64
3/21/2023	5.16	5.32	5.65	5.16	5.32	5.65
3/20/2023	5.14	5.32	5.66	5.14	5.32	5.66
3/17/2023	5.09	5.26	5.60	5.09	5.26	5.60
3/16/2023	5.14	5.31	5.63	5.14	5.31	5.63
3/15/2023	5.14	5.33	5.70	5.14	5.33	5.70
3/14/2023	5.24	5.41	5.76	5.24	5.41	5.76
3/13/2023	5.15	5.35	5.74	5.15	5.35	5.74
Average	5.15	5.32	5.67	5.15	5.32	5.67

Sources and Notes:
[1]: AA estimated as A - 0.5 * (BBB - A).
[2], [3]: Bloomberg as of March 31, 2023.
[4] - [6]: matching Bloomberg bond yields as of Mar 31, 2023.

Workpaper #2 to Schedule No. MT-11

Water Sample

Panel B: Bond Yield Summary

Company	3/31/2023	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Amer. States Water	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
Amer. Water Works	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
Artesian Res Corp	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
California Water	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
Essential Utilities	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
Global Water Resources Inc	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
Middlesex Water	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
SJW Group	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
York Water Co. (The)	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%

Sources and Notes:
[1] - [6]: Ratings based on Workpaper #1 to Schedule No. MT-11, Panel B. Bond yields from Bloomberg as of March 31, 2023.
[7]: ([2] + [3] + [4] + [5] + [6]) / 5.

Workpaper #2 to Schedule No. MT-11

Water Sample

Panel C: Preferred Equity Yield Summary

Company	3/31/2023	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Amer. States Water	-	-	-	-	-	-	-
Amer. Water Works	-	-	-	-	-	-	-
Artesian Res Corp	-	-	-	-	-	-	-
California Water	-	-	-	-	-	-	-
Essential Utilities	-	-	-	-	-	-	-
Global Water Resources Inc	-	-	-	-	-	-	-
Middlesex Water	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
SJW Group	-	-	-	-	-	-	-
York Water Co. (The)	-	-	-	-	-	-	-

Sources and Notes:
[1] - [6]: See Workpaper #1 to Schedule No. MT-11, Panels C. Preferred equity yields are from matching Bloomberg bond yields as of Mar 31, 2023
[7]: ([2] + [3] + [4] + [5] + [6]) / 5.

Schedule No. MT-12

Risk Positioning Cost of Equity at Great Oaks's Proposed Capital Structure

Water Sample

Using Value Line Betas

	Overall After-Tax Cost of Capital (Scenario 1)	Overall After-Tax Cost of Capital (Scenario 2)	Great Oaks's Representative Regulatory % Debt	Representative Cost of BBB-Rated Utility Debt	Great Oaks's Representative Income Tax Rate	Great Oaks's Representative Regulatory % Equity	Estimated Return on Equity (Scenario 1)	Estimated Return on Equity (Scenario 2)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Core Water Sample								
CAPM using Value Line Betas	8.0%	7.1%	30.0%	5.7%	28.0%	70.0%	9.7%	8.3%
ECAPM (1.50%) using Value Line Betas	8.2%	7.3%	30.0%	5.7%	28.0%	70.0%	10.0%	8.7%
Full Sample								
CAPM using Value Line Betas	7.9%	7.0%	30.0%	5.7%	28.0%	70.0%	9.5%	8.2%
ECAPM (1.50%) using Value Line Betas	8.1%	7.2%	30.0%	5.7%	28.0%	70.0%	9.8%	8.6%

Sources and Notes:
[1]: Schedule No. MT-11; Panel A, [9] - [10].
[2]: Schedule No. MT-11; Panel B, [9] - [10].
[3]: Provided by Great Oaks.
[4]: Based on a BBB rating. Yield from Bloomberg as of March 31, 2023.
[5]: Provided by Great Oaks.
[6]: Provided by Great Oaks.
[7]: {[1] - ([3] x [4] x (1 - [5])}/ [6]
[8]: {[2] - ([3] x [4] x (1 - [5]))}/ [6]

Scenario 1: Long-Term Risk Free Rate of 3.80%, Long-Term Market Risk Premium of 7.20%.
Scenario 2: Long-Term Risk Free Rate of 3.90%, Long-Term Market Risk Premium of 5.50%.

Estimation of S&P 500 Cost of Equity - DDM

Schedule No. MT-13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Value Line Betas	Debt Beta	5-Year Average Common Equity to Market Value Ratio	5-Year Average Preferred Equity to Market Value Ratio	5-Year Average Debt to Market Value Ratio	Great Oaks's Representative Income Tax Rate	Asset Beta: Without Taxes	Asset Beta: With Taxes
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Amer. States Water	0.70	0.05	82.5%	0.0%	17.5%	28.0%	0.59	0.61
Amer. Water Works	0.90	0.05	68.5%	0.0%	31.5%	28.0%	0.63	0.69
Artesian Res Corp	0.70	0.05	68.5%	0.0%	31.5%	28.0%	0.50	0.54
California Water	0.70	0.05	71.6%	0.0%	28.4%	28.0%	0.52	0.56
Essential Utilities	0.95	0.05	66.1%	0.0%	33.9%	28.0%	0.64	0.71
Global Water Resources Inc	0.80	0.05	70.1%	0.0%	29.9%	28.0%	0.58	0.62
Middlesex Water	0.75	0.05	80.4%	0.1%	19.4%	28.0%	0.61	0.65
SJW Group	0.80	0.05	59.5%	0.0%	40.5%	28.0%	0.50	0.55
York Water Co. (The)	0.80	0.05	81.6%	0.0%	18.4%	28.0%	0.66	0.70
Core Water Sample Average	0.80	0.05	72.9%	0.0%	27.1%	28.0%	0.59	0.64
Full Sample Average	0.79	0.05	72.1%	0.0%	27.9%	28.0%	0.58	0.62

Sources and Notes:
[1]: Workpaper # 1 to Schedule No. MT-10, [1].
[2]: Workpaper #1 to Schedule No. MT-13, [7].
[3]: Schedule No. MT-4, [4].
[4]: Schedule No. MT-4, [5].
[5]: Schedule No. MT-4, [6].
[6]: Great Oaks's Representative Tax Rate.
[7]: [1]*[3] + [2]*([4] + [5]).
[8]: {[1]*[3] + [2]*([4]+[5]*(1-[6]))} / {[3] + [4] + [5]*(1 -[6])}.

Workpaper #1 to Schedule No. MT-13

Debt Beta Summary

Company	3/31/2023	1st Quarter, 2023	1st Quarter, 2022	1st Quarter, 2021	1st Quarter, 2020	1st Quarter, 2019	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Amer. States Water	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Amer. Water Works	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Artesian Res Corp	0.05	0.05	0.05	0.05	0.05	0.05	0.05
California Water	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Essential Utilities	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Global Water Resources Inc	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Middlesex Water	0.05	0.05	0.05	0.05	0.05	0.05	0.05
SJW Group	0.05	0.05	0.05	0.05	0.05	0.05	0.05
York Water Co. (The)	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Sources and Notes:
[1] - [6]: Ratings based on Workpaper #2 to Schedule No. MT-11, Panel B. See Attachment MRT-2 Technical Appendix for debt betas.
[7]: Average of [2] through [6].

Schedule No. MT-14

Water Sample Average Asset Beta Relevered at Great Oaks's Proposed Capital Structure

	Asset Beta	Assumed Debt Beta	Great Oaks's Representative Regulatory % Debt	Great Oaks's Representative Income Tax Rate	Great Oaks's Representative Regulatory % Equity	Estimated Equity Beta
	[1]	[2]	[3]	[4]	[5]	[6]
Core Water Sample						
Asset Beta Without Taxes	0.59	0.10	30.0%	28.0%	70.0%	0.80
Asset Beta With Taxes	0.64	0.10	30.0%	28.0%	70.0%	0.80
Full Sample						
Asset Beta Without Taxes	0.58	0.10	30.0%	28.0%	70.0%	0.79
Asset Beta With Taxes	0.62	0.10	30.0%	28.0%	70.0%	0.79

Sources and Notes:
[1]: Schedule No. MT-13, [7] - [8].
[2]: Attachment MRT-2 Technical Appendix.
[3]: Provided by Great Oaks.
[4]: Great Oaks's Representative Tax Rate.
[5]: Provided by Great Oaks.
[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Workpaper #1 to Schedule No. MT-14

Comparison of Value Line's Measured Equity Betas for the Sample Companies To Betas Re-levered at 70% Equity

Company		Levered Equity Beta [1]	5-year Average Equity (%) [2]	Unlevered Assets Beta [3]	Re-levered @ 70% Equity [4]
Amer. States Water	[a]	0.70	82.5%	0.61	0.79
Amer. Water Works	[b]	0.90	68.5%	0.69	0.89
California Water	[c]	0.70	71.6%	0.56	0.71
Essential Utilities	[d]	0.95	66.1%	0.71	0.91
Middlesex Water	[e]	0.75	80.4%	0.65	0.83
SJW Group	[f]	0.80	59.5%	0.55	0.71
York Water Co. (The)	[g]	0.80	81.6%	0.70	0.89
Artesian Res Corp	[h]	0.70	68.5%	0.54	0.69
Global Water Resources Inc	[i]	0.80	70.1%	0.62	0.80
Sample Average	**[j]**	**0.80**	**71.5%**	**0.63**	**0.81**

Sources and Notes:

[1] - [3]: Attachment MRT-3, Table MRT-13.

[4]: Hamada re-levering procedure as laid out in Schedule No. MT-14 using Great Oaks tax rate of 28% and debt beta of 0.05 for A-rated sample companies and 0.10 debt beta for Great Oaks.

Schedule No. MT-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 3.80%, Long-Term Market Risk Premium of 7.20%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Core Water Sample					
Asset Beta Without Taxes	3.80%	0.80	7.20%	9.6%	9.9%
Asset Beta With Taxes	3.80%	0.80	7.20%	9.6%	9.9%
Full Sample					
Asset Beta Without Taxes	3.80%	0.79	7.20%	9.5%	9.8%
Asset Beta With Taxes	3.80%	0.79	7.20%	9.5%	9.8%

Sources and Notes:
[1]: Tolleth Direct Testimony.
[2]: Schedule No. MT-14, [6].
[3]: Tolleth Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. MT-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.90%, Long-Term Market Risk Premium of 5.50%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Core Water Sample					
Asset Beta Without Taxes	3.90%	0.80	5.50%	8.3%	8.6%
Asset Beta With Taxes	3.90%	0.80	5.50%	8.3%	8.6%
Full Sample					
Asset Beta Without Taxes	3.90%	0.79	5.50%	8.2%	8.5%
Asset Beta With Taxes	3.90%	0.79	5.50%	8.2%	8.5%

Sources and Notes:
[1]: Tolleth Direct Testimony.
[2]: Schedule No. MT-14, [6].
[3]: Tolleth Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

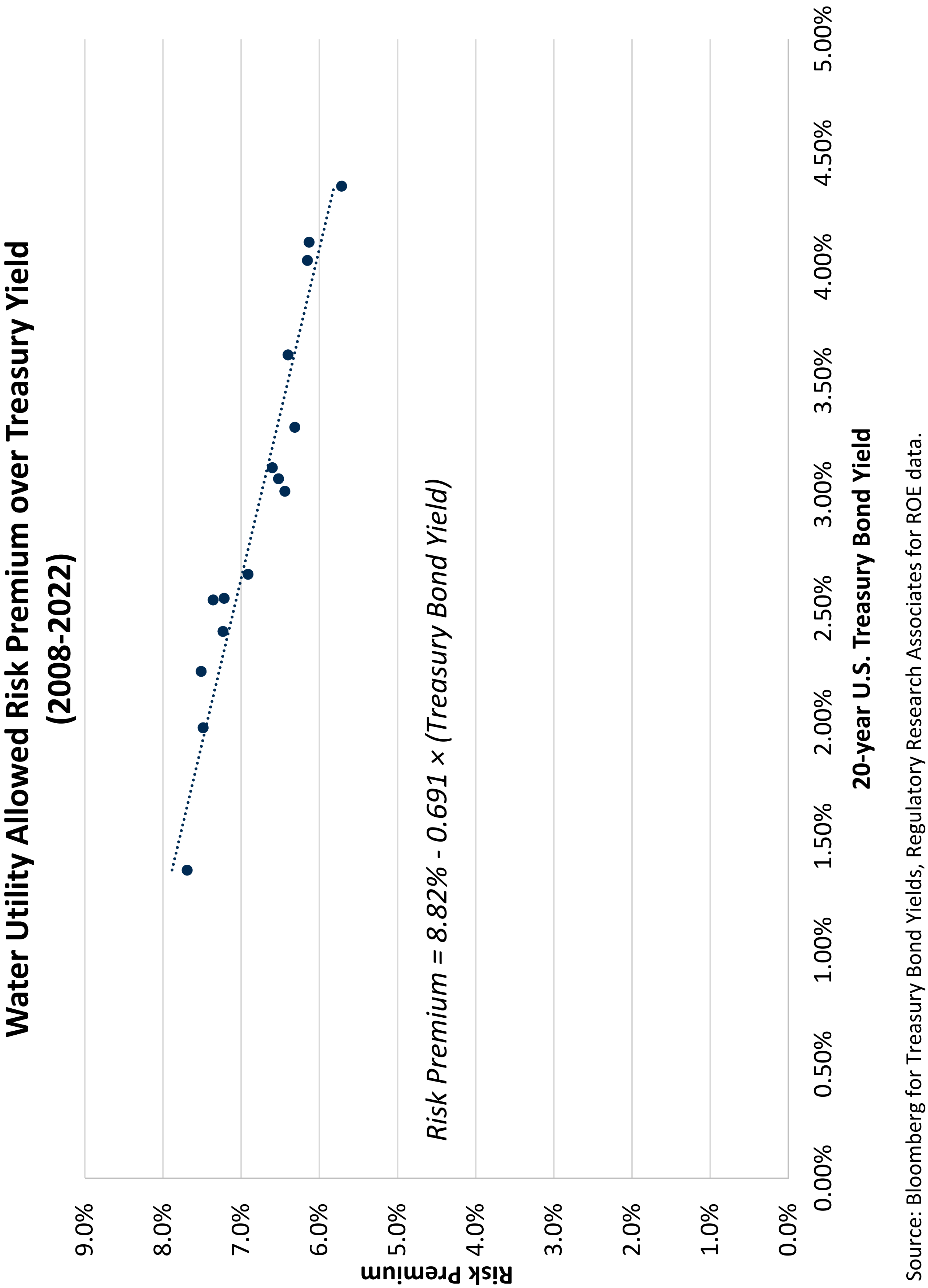
Risk Premiums Determined by Relationship Between Authorized ROEs and Long-term Treasury Bond Rate

	Forward Looking 20 year Treasury Bond Estimate	Intercept	Slope	Estimated Risk Premium	Estimated Return on Equity
	[1]	[2]	[3]	[4] = [2] + [1] × [3]	[5] = [1] + [4]
Scenario 1:	3.80%	8.82%	-0.691	6.19%	10.0%
Scenario 2:	3.90%	8.82%	-0.691	6.12%	10.0%

Sources and Notes:

[1]: Blue Chip Economic Indicators Forecast March 2023, forecast of 10-year T-bond yield in 2025, adjusted to 20-year horizon. The estimate for Scenario 2 is based on the representative rate for March 2023.

[2] & [3]: see tab SS1-Regression Output.


Water Utility Allowed Risk Premium over Treasury Yield
(2008-2022)
Risk Premium = 8.82% - 0.691 × (Treasury Bond Yield)
Risk Premium
9.0%
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0.00%
0.50%
1.00%
1.50%
2.00%
2.50%
3.00%
3.50%
4.00%
4.50%
5.00%
20-year U.S. Treasury Bond Yield
Source: Bloomberg for Treasury Bond Yields, Regulatory Research Associates for ROE data.

SS1-Regression Results

	Slope	Intercept
Coefficient	-0.691	8.82%
R Squared	0.91	0.18%

Note: Estimated by regressing Risk Premium on 20 year Treasury Bond Yield

SS2- Risk Premium Calculation

Year	Authorized Return on Equity [1]	20 year Treasury Bond Yield [2]	Risk Premium [3] = [1] - [2]
2008	10.1%	4.36%	5.7%
2009	10.2%	4.11%	6.1%
2010	10.2%	4.03%	6.2%
2011	10.0%	3.62%	6.4%
2012	9.9%	2.54%	7.4%
2013	9.7%	3.12%	6.6%
2014	9.6%	3.07%	6.5%
2015	9.8%	2.55%	7.2%
2016	9.7%	2.23%	7.5%
2017	9.6%	2.65%	6.9%
2018	9.5%	3.02%	6.4%
2019	9.6%	2.40%	7.2%
2020	9.0%	1.35%	7.7%
2021	9.5%	1.98%	7.5%
2022	9.6%	3.30%	6.3%
2023		3.90%	
Average	9.73%	2.95%	6.78%

Sources:
[1]: S&P Global Market Intelligence, Regulatory Research Associates (RRA)
[2]: Bloomberg; average of daily yield values.