STATE OF ALASKA

THE REGULATORY COMMISSION OF ALASKA

Before Commissioners:

Stephen A. McAlpine
Robert M. Pickett, Chair
Antony G. Scott
Daniel A. Sullivan
Jan Wilson

In the Matter of the Tariff Revision Designated as TA 168-122, filed by MUNICIPALITY OF ANCHORAGE d/b/a ANCHORAGE WATER AND WASTEWATER UTILITY, for its Water Utility, for Interim and Permanent Rate Relief

TA168-122

In the Matter of the Tariff Revision Designated as TA 168-126, filed by MUNICIPALITY OF ANCHORAGE d/b/a ANCHORAGE WATER AND WASTEWATER UTILITY, for its Wastewater Utility, for Interim and Permanent Rate Relief

TA168-126

DIRECT TESTIMONY OF DR. BENTE VILLADSEN

December 28, 2020

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I. Introduction and Summary

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

A1. My name is Bente Villadsen and I am a Principal of The Brattle Group, whose business address is One Beacon Street, Suite 2600, Boston, MA 02108.

Q2. Please summarize your professional qualifications.

A2. I have more than 20 years of experience working with regulated utilities on cost of capital and related matters. My practice focuses on cost of capital, regulatory finance, and accounting issues. I am the co-author of the text, "Risk and Return for Regulated Industries" and a frequent speaker on regulated finance at conferences and webinars. I have testified or filed expert reports on cost of capital in Alaska, Arizona, California, Illinois, Michigan, New Mexico, New York, Oregon, and Washington, as well as before the Bonneville Power Administration, Federal Energy Regulatory Commission ("FERC"), the Surface Transportation Board, the Alberta Utilities Commission, and the Ontario Energy Board. I have provided white papers on cost of capital to the regulators in Australia, Canada, and Europe. I have testified or filed testimony on regulatory accounting issues before the Federal Energy Regulatory Commission, the Regulatory Commission of Alaska, the Michigan Public Service Commission, the Texas Public Utility Commission as well as in international and U.S. arbitrations and regularly provide advice to utilities on regulatory matters as well as risk management.

I hold a Ph.D. from Yale University and as BS/MS from University of Aarhus, Denmark. Appendix A contains more information on my professional qualifications as well as a list of my prior testimonies and publications.

II. Summary of Conclusions

Q3. Please summarize your testimony.

A3. Anchorage Water Utility (AWU) and Anchorage Wastewater Utility (ASU) have asked me to determine the cost of equity and a capital structure that leads to a fair rate of return of

equity for AWU and ASU in connection with AWU's and ASU's request to increase rates. My recommendation also considers the business and financial risk of AWU and ASU relative to a group of proxy companies to arrive at my recommendation for the allowed Return on Equity ("ROE").

The current determination of AWU's and ASU's ROE takes place during extremely volatile market conditions due to the ongoing impacts from the COVID-19 pandemic, which has led to unprecedented low U.S. Treasury bond yields and substantial stock and oil price drops, while measures of volatility spiked to all-time highs and remain elevated compared to long-term averages. At the same time, measures of the premium investors require over and above the risk-free rate to invest in equity has increased dramatically. In that light, it is important to assure investors that the allowed ROE and capital structure is such that AWU and ASU can not only raise needed capital but also provide a return that is comparable to those that investors expect. Importantly, while utility stock largely followed the overall market down in the beginning of the COVID-19 pandemic, utility stocks have not regained as much of the lost value as has the overall market.

For comparison, at the time of my Reply Testimony for AWU's and ASU's prior ROE proceeding (October 2019), I recommended at ROE of 10.75 percent for AWU and an ROE of 10.25 percent for ASU based on prevailing market conditions and expectations at that time.[1] Around the same time, the Office of the Attorney General Regulatory and Public Advocacy Section (RAPA) had recommended an ROE of 9.5% for both AWU and ASU.[2] At that time, the market volatility measured by the Chicago Board of Options Exchange's CBOE Volatility Index (VIX) was approximately 14.00.[3] More recently, the VIX reached an all-time high of 82.69 on March 16, 2020 and has remained elevated since then – VIX

[1] Dr. Bente Villadsen, "Pre-Filed Reply Testimony of Dr. Bente Villadsen," The Regulatory Commission of Alaska, Case U-19-005/U-19-006, at 5, Lines 6-12, October 21, 2019.

[2] Mr. David C. Parcell, "Pre-Filed Direct Testimony of Mr. David C. Parcell," The Regulatory Commission of Alaska, Case U-19-005/U-19-006, at 6, Lines 8-22, September 6, 2019.

[3] Bloomberg, as of October 21, 2019, accessed October 13, 2020.

is currently at approximately 21.57.[4] Similarly, Bloomberg's calculation of the market risk premium (the premium investors require over and above the risk-free rate to hold equity) was about 7.01% in October 2019. Since then, it reached a high of 9.84% in March 2020 and it has remained elevated since, averaging 8.13% in 2020 and is currently at 7.85%.[5] Simply put, the financial markets are in extreme turmoil, which has had a negative impact on investors—not just in terms of returns but also with regard to volatility and risk.[6] As a result, it is important to look to stability in investors allowed returns and recognize that currently low Treasury yields are not reflective of a low cost of equity. Specifically, all data point to a higher return on equity as of today compared to October 2019 when RAPA and I last recommended ROEs for AWU and ASU. Put differently, if the recommended ROEs of 9.5 percent to 10.75 percent was appropriate in late 2019, then the ROE as of today must be at least as high as, if not higher. Consequently, I recommend a ROE of 9.75 - 10.75% for the additional reasons articulated below. I find that a ROE of 10.25% is a reasonable albeit a conservative estimate that weighs the non-COVID-19 estimates more than those focusing on the current financial conditions. I understand that AWU / ASU are applying for a lower ROE of 9.75 percent to reduce rate increases during a time, when many customers are impacted financially by the ongoing COVID-19 pandemic.

To calculate the ROE that AWU and ASU should be allowed an opportunity to earn, I used three distinct methods: (i) the Capital Asset Pricing Model (CAPM) and a variation thereof—the Empirical CAPM (ECAPM), (ii) the Discounted Cash Flow (DCF) model and a multi-stage variation, and (iii) a Risk Premium model. Each model has its pros and cons and I consider it important to consider multiple models. I estimate a range of reasonable ROE estimates for generic water and wastewater utilities.[7] Because publicly traded water

[4] Bloomberg, accessed December 18, 2020. VIX has averaged 29.91 in 2020 (through November 30) versus its long run average of 19.9 (January 2000 to September 2020).

[5] *Ibid*., Measured over 10-year US Treasury bond.

[6] I acknowledge that all of society has been impacted to a degree not seen in decades, but I focus my discussion on the financial and economic impacts in this report.

[7] I select my water and wastewater utility sample from Value Line's Water Utility group, which included companies in the water and wastewater industry. All sample companies engage in both water and wastewater activities.

companies engage in regulated activities in both the water and wastewater industry, I consider the group comparable to both AWU and ASU.

To evaluate the increased market uncertainty and on-going impacts of COVID-19, my recommendation also relies on two sets of CAPM and ECAPM analyses. The first approach—the Traditional Approach—uses inputs and assumptions intended to capture longer-dated capital market trends. The second approach—the Current Conditions Approach—uses more near term measurements of inputs and assumptions to capture the recent heightened financial and economic uncertainty. Under this approach, I also consider the implications of the current market conditions on the DCF models. Given that the ROE and capital structure set forth in this proceeding will begin in 2021 and prevail for some time thereafter, AWU's and ASU's cost of equity is likely higher than indicated by the Traditional Approach but lower than what the current capital markets would indicate.

At year-end 2019, AWU had 58% debt (42% equity), while ASU had 64% debt (36% equity) on its financial statements, [8] while the average water utility had about 55% debt on its balance sheet.[9] Thus, AWU's equity percentage and even more so ASU's equity percentage is below that of other water and wastewater utilities. Additionally, ASU is expected to have an actual equity percentage between 31 and 43 percent equity through 2027.[10] I therefore recommend that ASU's return on equity be determined using a hypothetical capital structure. Relying on a hypothetical capital structure for ASU makes a comparison between ASU and the sample more useful. AWU is expected to increase the equity portion in its capital structure to 50% percent by 2027.[11] Based on this information, I recommend that the average book capital structure of the water utilities I consider in my comparable sample be used as the capital structure of ASU. As AWU's equity percentage is higher, I recommend using AWU's actual capital structure.

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8 AWWU 2021 Long-Range Financial Plan.

9 Bloomberg, as of August 31, 2020.

10 AWWU 2021 Long-Range Financial Plan.

11 *Id*.

When evaluating the cost of equity, it is important to also consider business risk. There are several such risks for AWU and ASU. For example, both AWU and ASU have a very high Contribution in Aid of Construction (CIAC) relative to other water utilities, AWU and ASU have complied with a statutory moratorium on shut-off due to non-payment since March 2020, and there have been significant shifts in usage patterns as a result of COVID-19 mitigation measures implemented by the State of Alaska, the Municipality of Anchorage, and individual customers.[12] As, for example, betas are measured over five years, the data for the comparable companies do not fully reflect such measures even if they too have experienced COVID-19 moratoriums. I further discuss how these and other business risk factors affect the cost of equity in Section III.B.

Based on my analyses using different cost of equity models and an assessment of AWU's and ASU's specific risks, I find that a reasonable return on equity for AWU and ASU at the current time to be in the range of 9.5 to 10.5 percent and recommend a ROE towards the upper end of that range; e.g., 10.25%.[13] The range of the results from the CAPM (Traditional and Current Conditions), DCF, and Risk Premium models are shown in Figure **1** below.

[12] Municipality of Anchorage, "Mayor announces temporary suspension of AWWU and ML&P utility shutoffs," *Press Release*, March 17, 2020, https://www.muni.org/Departments/Mayor/PressReleases/Pages/Mayor-announces-temporary-suspension-of-AWWU-and-MLP-utility-shutoffs.aspx.

I understand that Senate Bill No. 241, which mandated no shutoffs expired November 15, 2020. http://rca.alaska.gov/RCAWeb/NewsItems/NewsItemDetails.aspx?id=4039b048-44be-4fcb-aaed-e884ae2dfcd3

[13] I understand that AWWU in consideration of the financial impact of the ongoing COVID-19 pandemic are requesting a lower ROE.

Figure 1 **– Return on Equity at 50% Equity**

	Reasonable Range	Midpoint Estimate
CAPM - Traditional	8.6% - 9.1%	8.9%
CAPM – Current Conditions	11.0% - 11.7%	11.4%
DCF	8.8% - 13.9%	11.4%
Risk Premium	9.4% - 9.5%	9.45%
Average	9.5% - 11.0%	10.3%

III. Cost of Capital Principles and Risk

A. COST OF CAPITAL PRINCIPLES

Q4. What are the guiding principles to determine a just and reasonable rate of return on utility investments?

A4. The seminal guidance was provided by the U.S. Supreme Court in the Hope and Bluefield cases, which found that:[14]

1. The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks;[15]

2. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility; and

3. 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.[16]

[14] *Bluefield Water Works & Improvement Co. v. Public Service Commission 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).

[15] *Hope.*

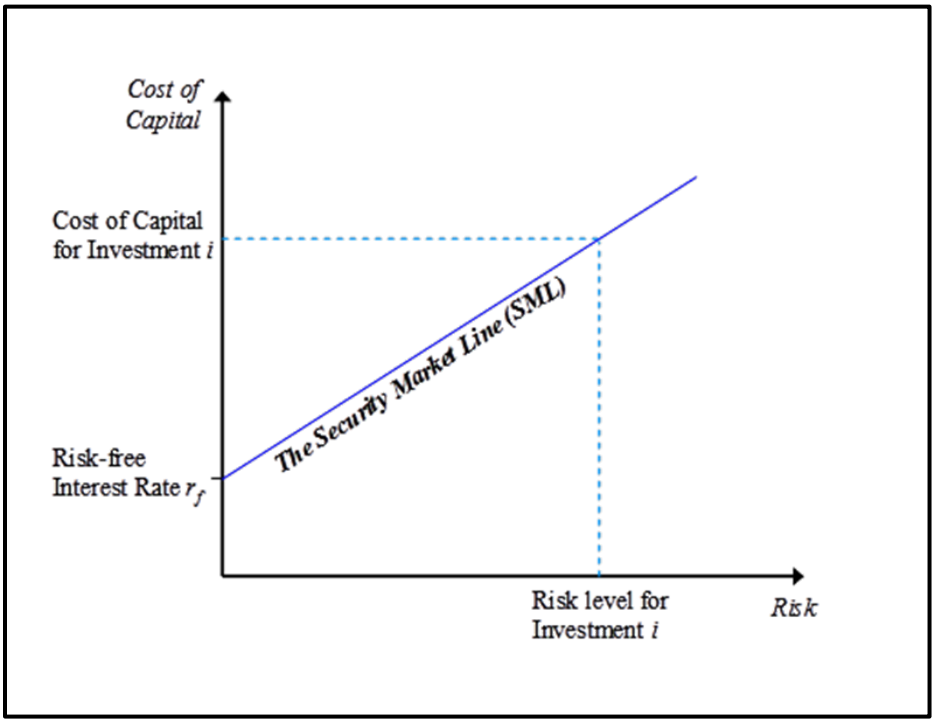
[16] *Bluefield.*

Q5. How is the "cost of capital" defined?

A5. The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. The cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. "Expected" is used in the statistical sense: the mean of the distribution of possible outcomes. The terms "expect" and "expected," as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

The definition of the cost of capital recognizes a tradeoff between risk and return that can be represented by the "security market risk-return line" or "Security Market Line" for short. This line is depicted in Figure 2 below. The higher the risk, the higher the cost of capital required.

Figure 2 – The Security Market Line



Q6. Why is the cost of capital relevant in utility regulation?

A6. The "cost of capital" for rate regulation purposes is the return that utility investors expect to earn on investments of comparable risk[17] and is one of the relevant factors set forth in the *Hope* and *Bluefield* cases.

Q7. What does this mean from an economic perspective?

A7. From an economic perspective, rate levels that give investors a fair opportunity to earn the cost of capital are the lowest levels that compensate investors for the risks they bear. A utility's ability to attract capital and maintain its financial integrity requires that the combined equity return and equity ratio be such that not only is the expected return commensurate with that of other enterprises, but it also meets the expectations of credit market participants.

More important for customers, however, are the broader economic consequences of providing an inadequate return to the company's investors. In the short run, deviations from the expected rate of return on the rate base from the cost of capital may seemingly create a "zero-sum game"—investors gain if customers are overcharged, and customers gain if investors are shortchanged. In the longer term, inadequate returns are likely to cost customers—and society generally—far more than may be saved in the short run. Inadequate returns lead to inadequate investment, whether for maintenance or for new plant and equipment. Without access to investor capital, the company may be forced to forgo opportunities to decrease its costs through timely maintenance, upgrading, and expanding of its systems and facilities. Indeed, the cost to consumers of an undercapitalized industry can be far greater than any short-run gains from shortfalls in the cost of capital. This is especially true in capital-intensive industries (such as the water, electric and gas utility industry), which feature systems that take time to decay. Such long-lived infrastructure assets cannot be repaired or replaced overnight, because of the time necessary to plan and

[17] See Steward C. Myers, "The Application of Finance Theory to Public Utility Rate Cases," *The Bell Journal of Economics & Management Science* 3:58-97 (1972).

construct the facilities. Thus, it is in customers' interest not only to make sure the expected return of the investors does not exceed the cost of capital, but also that the expected return does not fall short of the cost of capital.

B. THE IMPACT OF RISK ON THE COST OF CAPITAL

Q8. Please summarize how you factored in risk when determine the cost of capital.

A8. I attempt to select a group of sample companies with business risks similar to those of ASU and AWU. However, because the number of comparable water and wastewater utilities is limited, it is important to consider what effect, if any, differences in business risk have on the recommended ROE or capital structure. Similarly, different companies operate with different degrees of leverage (or level of debt in the capital structure),[18] so I consider what difference there is between that of the sample utilities and the regulatory capital structure of AWU and ASU, respectively. Specifically, I compare the business risk of ASU and AWU to that of the sample and determine the impact of any difference in financial risk. The details are discussed below.

Q9. Why is capital structure important for the determination of the cost of equity?

A9. Owners of a company with more debt face more equity risk and therefore the return on equity needs to be greater.[19] This is irrespective of the ownership structure. In liquidation, debt holders are paid prior to owners, therefore debt increases risk for the residual claimants/owners. There are several manners in which the impact of financial risk can be taken into account in an analysis of cost of equity; including that for a regulated utility. Financial risk considerations are standard in modern finance and used by providers of financial data such as Duff & Phelps explicitly relies on the Hamada methodology when determining the cost of equity for companies.[20] Similarly, recent developments in the regulatory treatment of cost of capital for, for example, telecommunication carriers have

[18] Financial economists refer to leverage as financial risk.

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

[20] Duff & Phelps, 2019 Valuation Handbook: US Guide to Cost of Capital, Chapter 5, p. 18

recognized the importance hereof. Consequently, the Federal Communications Commission (FCC) in a 2016 order acknowledged that (1) using market values to estimate the capital structure is reasonable and (2) derive an implied return on equity from the estimated WACC (weighted average cost of capital).[21] Thus, the FCC acknowledged that market value capital structures are the relevant measure of leverage and impact the ROE.[22] The Surface Transportation Board (STB) similarly relies on market value capital structures to determine the overall cost of capital for freight railroads.[23]

One way is to determine the after-tax weighted-average cost of capital for the entities and let that figure be constant between the estimate obtained for the sample and the entity to which it is applied. This assumes that the after-tax 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 capital structure.[24] A second approach was developed by Professor Hamada, who unlevered the beta estimates in the CAPM to obtain a so-called all-equity or assets beta and then re-levered the beta to determine the beta associated with the target regulatory capital structure. This requires an estimate of the systematic risk associated with debt (i.e., the debt beta), which is usually quite small. In Exhibit BV-02, I set forth additional technical details related to methods to account for financial risk when estimating the cost of capital.

[21] Federal Communications Commission, "Report and Order, Order and Order on Reconsideration, and Further Notice of Proposed Rulemaking," FCC 16-33, issued March 30, 2016 pp 3189-3190 and p. 3210.

[22] Other regulators that consider financial leverage include the Florida PUC for water and wastewater utilities (Order No. PSC-2017-0361-FOF-WS), the Federal Energy Regulatory Board in Cost of New Entry studies for electric (Docket ER14-2940-000, November 28, 2014, ¶81), the Surface Transportation Board (Docket No. EP 558 (Sub-No 18), and to a degree, the Alabama Public Utilities Commission (Dockets 18117 and 18416, August 21, 2013) as well as foreign regulators.

[23] See, for example, Surface Transportation Board, "Docket No. EP 558 (Sub-No. 18)," dated August 6, 2016 p. 15

[24] See also the discussion in Jonathan Berk & Peter DeMarzo, "Corporate Finance," 3rd Edition, 2014, p. 490

Q10. Why is a hypothetical capital structure merited for ASU?

A10. ASU's actual capital structure included approximately 64% debt as of year-end 2019,[25] while AWU had 58% debt at year-end.[26] AWU is expected to increase its equity percentage, while ASU is expected to operate with as little as 31% equity over the next few years while these rates will be in effect (see Figure 3).[27] This is a higher debt percentage than that of any of the comparable companies. Because the cost of equity depends on the capital structure as discussed above, it is therefore necessary that ASU either be allowed a "normalized" hypothetical capital structure for ratemaking purposes or an unusually high ROE to ensure ASU has an opportunity to earn a reasonable return on equity and the ability to maintain a revenue bond coverage that allows ASU to pay interest and principal on a timely schedule.[28] It is not uncommon in situations where the capital structure of the regulated utility deviates from that of the industry to allow the use of a hypothetical capital structure for ratemaking purposes. The Commission has in the past acknowledged that a hypothetical capital structure may have merit if the book capital structure is unreasonable or exposes the utility to excessive risk. In the current case, ASU's book capital structure is outside of the range of what, for example, Moody's considers reasonable for an A rating.[29]

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[25] *See* Yutrzenka Testimony, Exhibit GBY-03, p. 80.

[26] *See* Yutrzenka Testimony, Exhibit GBY-02, p. 79.

[27] Looking at ASU's Long Range Financial Plan for years 2021-2027, which assumes an ROE of 9.75% on 50% equity, the resulting coverage ratios (Revenue Bond Debt Service Coverage and total debt service coverage) are above 2.7 and 1.2, respectively. *See* Yutrzenka Testimony, Exhibits GBY-04 and GBY-05. These coverage ratios would be consistent with Moody's guidelines for an investment grade credit rating.

[28] For example, RCA Order No. 22 in dockets U-13-184/U-15-096/U-15-097 re Anchorage Municipal Light and Power (April 3, 2015) at p. 51 notes that the Commission "use[s] a hypothetical capital structure when (1) the actual capital structure is inefficient or unreasonable, (2) the level of debt subjects the utility to excessive risks, or (3) the utility is part of a holding company system in which the utility's book capitalization and capital costs are not a true reflection of the system's capital costs with respect to the utility."

[29] Moody's Investors Service, "Regulated Water Utilities," June 8, 2018, p. 21.

Furthermore, using ASU's book capital structure of 36% equity would be lower than nearly every authorized capital structure in water utility rate cases over the prior 10 years.[30]

Figure 3 – AWU and ASU Capital Structure: Percent Equity[31]

	2021	2027
AWU	40%	50%
ASU	31%	43%

Q11. Would your ROE recommendation change if ASU's actual capital structure were to be used for ratemaking purposes?

A11. Yes. It is a common first step for cost of capital experts to rely on a sample of comparable companies to estimate the cost of equity for companies with comparable business risks. However, this is only the first step in determining the cost of equity for a specific company, because any one company may face larger business, financial, or regulatory risks than the sample. Step two is therefore an assessment of the risk associated with the target entities – ASU. Therefore, if ASU has less equity than the sample, an ROE adjustment needs to be made for the added risk in ASU's capital structure. Using ASU's actual capital structure, which included approximately 64% debt at year-end would require an ROE increase of more than 240 basis points. It is important to keep in mind that the cost to customers is the allowed dollar return on equity plus the cost of debt, if we ignore taxes, and the example below illustrates this. The cost to customers would be the same for (A) a hypothetical capital structure of 50% equity with an ROE of 10.25%, or (B) an actual capital structure of 36% equity with an ROE of 12.68%. Scenario A is simply more in line with what is commonly allowed.

[30] S&P Market Intelligence, "Water Utility Rate Case Database (rate case decisions 2010-2019)," accessed October 9, 2020. I note the one exception was Tennessee American Water Company in 2012 (Docket No. 12-00049), which received an authorized capital structure of 34.4% equity.

[31] *See* Yutrzenka Testimony, Exhibit GBY-04 and GBY-05

Figure 4 – Example Illustrating Customer Cost Associated with Cost of Capital

	Scenario A	Scenario B
Equity Percentage	50%	36%
Rate Base	$1,000	$1,000
Allowed ROE	10.25%	12.68%
Cost of Debt	4%	4%
Cost to Customers	$71.25	$71.25

Note: The rate base and cost of debt were chosen for illustrative purposes and do not reflect ASU's current rate base or cost of debt.

Because the cost of equity (and debt) depends on what capital structure is used, and the use of ASU's actual capital structure with approximately 64% debt not only exposes ASU to an excessive amount of financial risk but also is inefficient in that it makes it difficult to compare ASU to other utilities. I therefore recommend a hypothetical capital structure that includes 50% equity be used.

Q12. Are there any AWU or ASU-specific risk factors?

A12. Yes. First, the book value of total assets was approximately $633 million for AWU and $497 million for ASU at year-end 2019.[32] In comparison, the average and median of total assets for the sample at year-end 2019 exceeds $4.0 billion and $1.2 billion, respectively. Similarly, looking at the book equity among the sample companies the average and median was $1.1 billion and $463 million at year-end 2019, whereas AWU and ASU had only $373 million and $274 million, respectively. Thus, both AWU and ASU are substantially smaller than the average / median sample company. Below, I further discuss the impact of size risk and expected returns.

[32] *See* Yutrzenka Testimony, Exhibit GBY-02, p. 9 and Yutrzenka Testimony, Exhibit GBY-03, p. 8.

Figure 5 – Current Assets and Book Equity: Water Utilities

	Total Assets	Book Equity
Amer. States Water	$1,641	$602
Amer. Water Works	$22,682	$6,121
Artesian Res Corp	$560	$160
California Water	$3,111	$780
Global Water Resources Inc	$266	$25
Middlesex Water	$910	$324
SJW Corp.	$3,132	$890
York Water Co. (The)	$364	$134
Average	**$4,083**	**$1,129**
Median	**$1,276**	**$463**
Anchorage Water Utility	$629	$373
Anchorage Wastewater Utility	$493	$274

Bloomberg, data as of 12/31/2019.

Second, except in one year for AWU, neither has achieved the allowed return on equity since 2012. This is shown in Figure 6 below.

Figure 6 – AWU and ASU Earned Return on Net Position

	2019	2018	2017	2016	2015	2014	2013	2012
Allowed ROE	10.8%	10.8%	10.3%	11.0%	11.0%	11.0%	11.1%	11.6%
AWU Earned ROE	10.0%	6.2%	6.6%	6.8%	8.8%	11.3%	10.5%	7.9%
ASU Earned ROE	10.3%	8.6%	10.0%	5.4%	7.1%	10.0%	10.4%	10.7%

Sources & Notes:
Data from ASU and AWU Statistical Information.

Additionally, neither AWU nor ASU are expected to earn their allowed ROEs over the next several years.[33] Because the investment in fixed assets needs to be used and useful before the utility can recover capital cost, a utility that engages in capital expenditures necessarily faces a lag in the recovery of capital costs. This is the case for AWU and ASU. I understand that the Commission has adopted regulations that may help offset some regulatory lag

[33] *See* Yutrzenka Testimony, Exhibits GBY-04 and GBY-05.

pertaining to certain types of infrastructure investments.[34] While PRISM allows the earlier recovery of certain horizontal asset investment, this is a common type of regulatory mechanism among the sample companies and therefore already accounted for in the cost of equity estimates. Even so, AWU's and ASU's amount of forecasted capital spending is smaller than that of other water utilities in my sample group. AWU and ASU are expected to spend on average $19.9 million and $15.5 million per year, respectively, through 2027.[35] In 2019, the water utilities in my sample group spent an average of $301 million (median $121 million) compared with approximately $50 million at AWU and ASU.

Figure 7 – Capital Expenditures 2019

Company	Capital Expenditure ($ million)
Amer. States Water	$152
Amer. Water Works	$1,654
Artesian Res Corp	$41
California Water	$274
Global Water Resources Inc	$11
Middlesex Water	$89
SJW Corp.	$164
York Water Co. (The)	$21
Average	$301
Median	$121
Anchorage Water Utility	$51
Anchorage Wastewater Utility	$43

While AWU's capital expenditure relative to total assets is in line with that of the sample, ASU has higher capital expenditures relative to total assets than the sample.

Third, both AWU and ASU have a very large portion of their assets financed by CIAC.[36] The presence of a large CIAC has two effects. As AWU / ASU do not earn a return on

[34] 3 AAC 52 Amendment: Article 9. Plant Replacement and Improvement Surcharge Mechanism (PRISM), June 29, 2014

[35] *See* Yutrzenka Testimony, Exhibits GBY-04 and GBY-05

[36] *See* Yutrzenka Testimony, Exhibit GBY-02, p. 19 and Yutrzenka Testimony, Exhibit GBY-03, p. 19.

these funds, it has larger than usual operating risks; in essence, the utility is responsible for fixed costs over and above what it earns a return on. Therefore, the exposure to asset-related risks is larger than what is reflected in the rate making process. Further, as the CIAC funded assets are being replaced by utility funded assets, the utilities face financing risks. Specifically, the ratio of CIAC to Net Property, Plant and Equipment (PPE) or to long-term debt is much higher than that of any sample company. For example, the CIAC to PPE ratio of both AWU and ASU is three to four times that of the average sample company and none of the sample companies are close to having a CIAC to PPE or CIAC to long-term debt ratio comparable to that of AWU or ASU. Figure 8 below summarizes the results.

Fourth, assuming AWU will be allowed an equity percentage equal to its actual book equity and ASU will be allowed a hypothetical capital structure of 50% equity, the two utilities carry more financial risk than what is inherent in the CAPM and DCF cost of equity estimates. Because the CAPM and DCF models use data from capital markets to estimate the return on equity that investors require, the data entered into the calculation are market data – e.g., the total return to investors (changes in stock prices plus dividends) relative to the investment made. The investment is the dollar value of equity and debt, so the market value of equity and debt is what matters, when measuring the capital structure inherent in the CAPM and DCF based estimates of the cost of equity. Over the last five years, the average utility in my water sample has had approximately 71% equity in their capital structure, when measured at market value.[37]

Q13. Please summarize the impact of a large CIAC amount on ASU's risk.

A13. Figure 8 summarizes the CIAC among the sample companies as well as for AWU and ASU.

[37] I measure both equity and debt at market value. See, Exhibit BV-03 at Table No. BV-Water-4 (p. 13).

Figure 8 – CIAC Relative to Net Plant and LT Debt[38]

Company	CIAC	Carrying Value of LT Debt	% CIAC of LT Debt	Net PPE	% CIAC of Net PPE
Amer. States Water	135	281	48%	1,416	10%
Amer. Water Works	1,355	8,639	16%	18,232	7%
Artesian Res Corp	149	146	102%	531	28%
California Water	242	787	31%	2,406	10%
Global Water Resources Inc	15	115	13%	234	6%
Middlesex Water	98	231	42%	706	14%
SJW Corp.	286	1,306	22%	962	30%
York Water Co. (The)	40	101	40%	313	13%
Average	290	1,451	39%	3,100	15%
Median	142	256	35%	834	11%
AWU	198	236	84%	566	35%
ASU	160	197	81%	447	36%

As can be seen from Figure 8 above, both AWU and ASU has substantially more CIAC than the sample companies. For example, the average CIAC to long-term debt average is about 39% among the sample companies but 84% and 81% for AWU and ASU, respectively. Similarly, as a fraction of net PPE, AWU and ASU's CIAC are at 35% and 36%, while the sample's average and median are 15% and 11%, respectively.

Because CIAC has been used to finance long-lived assets that are operated by AWU or ASU, but AWU / ASU earn no return on those assets, the magnitude of the CIAC impacts the financial performance. The presence of fixed assets increases operating leverage, because these assets still need maintenance etc., but the revenue associated with the contributed assets does not include a return. Hence, the level of fixed costs to revenue is larger than what it would have been without so much CIAC and therefore operating leverage is increased. Operating leverage (like financial leverage) exposes the utility to risk.

[38] Long-Term Debt includes the current portion of long-term debt.

Q14. Can you provide an example demonstrating that a high level of CIAC creates risk for utilities?

A14. Yes. Just like increased leverage increases the financial risk for a utility, the magnitude of CIAC magnifies the volatility in income or change in net position. The following example illustrates this.

Assume as above that both Companies A and B have a rate base of $1,000 and that the allowed ROE is 10.25%, while the cost of debt is 5%. Further assume that operations, maintenance, administrative and general costs are $800. The only difference between the two companies is how their rate base is financed. Specifically, Company A is financed 50-50 with debt and equity, while Company B is financed with 40% debt, 40% equity, and 20% CIAC, which earns a return of zero. The base case is illustrated in Figure 9 below.

Figure 9 – The Impact of CIAC on Income Volatility: Base Case

	Company A	Company B
Rate Base	$1,000	$1,000
Debt	$500	$400
Equity	$500	$400
CIAC	$0	$200
O&M and A&G Costs	$800	$800
Debt Cost	$25	$25
Allowed Equity Return	$51	$41
Revenue Requirement	$876	$866
Income	$51	$41

Note that income divided by equity is exactly 10.25%.

Now assume for simplicity that both Companies A and B experience a five percent increase in cost with no impact on revenue. The realized income and return is shown in Figure 10 below.

Figure 10 – The Impact of CIAC on Income Volatility: Cost Increase

	Company A	Company B
Revenue	$876	$866
O&M and A&G Costs	$840	$840
Cost of Debt	$25	$25
Income	$11	$1

It is clear from Figure 9 and Figure 10 above that the presence of CIAC makes the utility more vulnerable to fluctuations in cost (or revenues). Hence, an increase in CIAC increases the volatility of a utility's income or change in net position, everything else being equal. Given the large volumes of CIAC that are present on AWU's and ASU's balance sheets, they are exceptionally vulnerable to changes in its operating cost or operating revenues. In other words, AWU's and ASU's significant level of CIAC results in higher business risk relative to the water utility sample.

Q15. Please discuss the impact of ASU and AWU being small in size.

A15. Looking to the Duff & Phelps company rankings by total assets, AWU and ASU are smaller than their peers with AWU and ASU falling in Duff & Phelps group 23, where groups are ranked from largest to smallest. The average sample company falls in group 13 and the median is in group 19.[39] Empirically, investors have required a higher premium to invest in smaller companies than in larger ones. For example, Duff & Phelps data indicates that companies in group 23 merits a risk premium of 17.33%, so that ASU's premium over the median sample company would be 1.64%.[40] While the estimated premia are different if size is measured by equity, sales, or net income, the directional effect is similar. ASU and AWU are smaller than the sample companies and thus, both AWU and ASU's smaller size merits a premium over that of the average or median sample company. I note that while some studies have found results that differ from those of Duff & Phelps for electric utilities,

[39] Duff & Phelps 2019 SBBI Valuation Handbook, Appendix 4.

[40] Id., The analysis uses the arithmetic average risk premium. Premium for group 13 is 15.69%.

others have found similar results when water utilities are included.[41] I note that Duff & Phelps includes all companies (including water and other utilities) that trade on the New York Stock Exchange or NASDAQ.

In addition, other standard financial models such as the Fama-French 3-Factor model includes a size factor as one of the statistically significant factors that provides explanatory value regarding returns.[42] Finally, I note that in ENSTAR's recent revenue requirement and cost of service proceeding before the Commission, ENSTAR argued that Alaska's higher cost environment and geographic isolation amplifies the impact of the "size effect" of ENSTAR's risks.[43] The Commission agreed that Alaska's geographic isolation and ENSTAR's smaller size increases risk.[44] I therefore maintain that size is a consideration for AWU and ASU. I use the fact that AWU and ASU are smaller than the sample companies as one of the facts that merit a higher business risk determination for ASU and AWU as compared to the average sample company. However, I conservatively do not add a size premium when estimating AWU and ASU's cost of equity. I also note that AWU and ASU are applying for a ROE that is below the average ROE I found to reduce rate increases in the light of the hardship the service territory is experiencing due to COVID-19.

Q16. Are there other indications that AWU and ASU should be placed in the upper half of the estimation results?

A16. For example, AWU's and ASU's operations are concentrated in Anchorage and the surrounding area, which due to its location creates some unique challenges in, for example,

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41 Annie Wong, "Utility Stocks and the Size Effect: An Empirical Analysis," Journal of the Midwest Finance Association 1993, pp. 95-101 and T.M. Zepp, "Utility Stock and the Size Effect – Revisited," *The Quarterly Review of Economics and Finance*, vol. 43, 2003, pp. 578-582

42 Eugene Fama & Kenneth French, "The Capital Asset Pricing Model: Theory and Evidence," *Journal of Economic Perspectives,* vol. 18, 2004, pp. 25-46. I note the other three factors of the model are the market risk premium, a measure of the company's size, and a measure of the book-to-market value.

43 Regulatory Commission of Alaska, "Order Resolving Revenue Requirement and Cost-of-Service Issues and Requiring Filings," Docket No. U-16-006, September 22, 2017, at 52 Lines 1-5.

44 Ibid., at 52 Lines 5-6.

construction due to weather. Further, while AWU's and ASU's service territories are concentrated in one area of one state, larger water and wastewater companies such as American Water Works and American States Water operate in multiple states. Thus, the sample is much more geographically diverse than are AWU or ASU.

Q17. What about AWWU having a higher bond rating than the comparable companies?

A17. First, I note that the sample utilities on average have a bond rating of about A. Thus, AWWU and the sample companies all have a bond rating well above the investment grade level. This is important because neither AA, A, nor BBB rated companies have much default risk.[45] Second, bond ratings are measures of default risk. Thus, the bond rating is the risk of default to the bonded debt only, not all debt. For example, it does not apply to the State of Alaska loan debt or any general debt of the utility to its vendors. The bonded debt is akin to secured versus unsecured debt and gets paid before the non-bonded debt, having a claim to the revenue ahead of any subordinated or other unsecured debt. Neither does it apply to equity holders, who are last in line. The risk profile as an equity holder looks much different than it does to a bonded debt holder and the bond rating says little about how the risks look from the bottom of the payment waterfall. A better measure of the risk of a company's equity is its beta measure, not its bond rating.

For these reasons, there is no argument that the bond rating of AWWU makes its equity any more or less risky than the sample companies.

Q18. Does the fact that AWU and ASU may have access to state loans affect the ROE?

A18. No. To the degree that AWU and ASU have access to loans from the State of Alaska that have lower interest rates than commercial loans, the lower interest rate is reflected in customer rates as borrowing costs are passed through to customers.

[45] According to Standard & Poor, "2019 Annual Global Corporate Default Study and Rating Transitions," April 2020 p. 7 the default rate for AA and A rated corporate entities has been zero from 2010 onward while BBB rated entities saw a default rate of 0.07% in 2011, 0.06% in 2016 and 0.11% in 2019, which are miniscule.

I note that in response to the COVID-19 pandemic, the State of Alaska passed SB 241, which allows state loan borrows to defer payments during the State declared public health disaster emergency.[46] These protections afforded to Alaska state loan borrowers, such as AWU and ASU, temporarily mitigated some of the cash flow and credit risk (i.e., business risk factors) impacts from the pandemic, but that temporary mitigation expired on November 15, 2020 with the end of SB 241. I understand that the effect of the deferral is that payments / amortization are extended for one year.

Q19. Does the lower interest rate on state loans affect AWU's and ASU's risk?

A19. Minimally, if at all. The state loans have lower interest rates than what is common for investor-owned utilities, but interest payments are simply payments to the state (lender). Because the interest payments are not capitalized, the amount does not show up as a liability on either the investor-owned or AWU's and ASU's financial statements. Similarly, the higher interest rate on investor-owned utilities' loans is reflected in the utilities revenue requirement as is the lower interest on AWU's and ASU's loans – hence the income statement accounts (but not the balance sheet accounts) are smaller due to the state loans, all else equal. Additionally, the state loans are not automatic and need to be periodically renewed or replaced, which (similar to investor-owned utilities loans) exposes the utilities to refinancing risk.

Q20. How do the current economic and financial uncertainties impact the business risk of regulated water utilities, such as AWU and ASU?

A20. The ongoing COVID-19 pandemic has had a dramatic impact on regulated utilities, including water and wastewater utilities. As governments issued stay-at-home orders in response to the pandemic, many parts of the economy shut down. This led to an unpreceded rise in unemployment as many companies struggle to stay in business. As of the week

[46] State of Alaska, "SB 241, Extending COVID-19 Declaration/Relief," April 9, 2020, at § 23, http://www.akleg.gov/basis/Bill/Detail/?Root=SB241.

ending August 22, 2020, the U.S. Department of Labor reports that approximately 29.6 million people across the U.S. were receiving some form of unemployment insurance – 20 times higher than the same period last year.[47] In Alaska, the job count was down 11.2% year-over-year in July with Anchorage seeing the largest job losses.[48] More recently, the US Bureau of Labor Statistics reported an unemployment rate of 5.9% for Alaska for October, which is close to the level experienced in early 2020.[49]

The risk that utilities face is that declines in loads will not be fully compensated and customer non-payments will result from businesses shutting down or people being laid-off. These impacts will be felt most strongly for utilities with large commercial and industrial customer bases or utilities that serve areas hit hardest by layoffs. At the height of the pandemic, the American Water Works Association ("AWWA") found that 46% of water utilities reported lower consumption with an estimated 35% reduction in non-residential water demand.[50] Many states and utilities have imposed moratoriums on customer shut-offs due to non-payment and suspended collection of late fees.[51] For example, the State of Alaska enacted a moratorium on residential utility shut-offs due to non-payment in Senate

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47 Eli Rosenberg, "884,000 people filed new jobless claims last week, as numbers remain above historic highs," *The Washington Post*, September 10, 2020, accessed September 10, 2020, https://www.washingtonpost.com/business/2020/09/10/884000-people-filed-jobless-benefits-last-week-second-week-row-fewer-than-million-claims/.

48 Alaska Department of Labor and Workforce Development, "July jobs down 11.2 percent from last July," No. 20-30, August 21, 2020, accessed September 2, 2020, https://labor.alaska.gov/news/2020/news20-30.htm.

49 U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics, Alaska, Series ID LASST020000000000003, accessed December 16, 2020, https://data.bls.gov/timeseries/LASST020000000000003.

50 American Water Works Association, "The Financial Impact of the COVID-19 Crisis on U.S. Drinking Water Utilities," April 14, 2020, pp. 9 and 12, https://www.awwa.org/Portals/0/AWWA/Communications/AWWA-AMWA-COVID-Report_2020-04.pdf.

51 Lillian Federico, "Bans of utility shut-offs during COVID-19 pandemic challenge regulators," S&P Global Market Intelligence, August 28, 2020, accessed September 2, 2020, https://platform.marketintelligence.spglobal.com/web/client?auth=inherit#news/article?KeyProductLinkType=2&id=60114756

Bill 241 effective as of March 11, 2020.[52] Also, on March 17, 2020 the Mayor of Anchorage announced a suspension of utility shutoffs due to non-payment for Anchorage Water and Wastewater Utility.[53] However, the State of Alaska moratorium in SB 241 expired on November 15, 2020. In aggregate, the AWWA estimates that the combination of reductions in utility shutoff moratoriums and customer non-payments combined with lower non-residential demand and lower customer growth will likely have a $13.9 billion impact on the water utility sector.[54]

IV. Capital Market Conditions

Q21. What do you cover in this section?

A21. In this section, I address recent changes in capital market conditions and the increased volatility in equity and debt markets and how that affects the cost of equity and its estimation. Specifically, I address (i) interest rate developments; (ii) recent changes in utility credit spreads; and (iii) investors perception of the market risk premium.

Q22. Can you provide a summary of recent events, which have impacted capital market conditions?

A22. Capital markets have seen historic changes in 2020 due to global events. In early 2020, long-standing economic uncertainties, which had been weighing on capital markets, were resolved. In January 2020, a series of trade deals were signed by the U.S. easing global trade tensions—Phase 1 of the U.S.-China trade deal and the USMCA were both signed in

[52] Alaska Senate Bill 241, at Section 19. Expired November 15, 2020. http://www.akleg.gov/basis/Bill/Text/31?Hsid=SB0241Z

[53] Municipality of Anchorage, "Mayor announces temporary suspension of AWWU and ML&P utility shutoffs," March 17, 2020, https://www.muni.org/Departments/Mayor/PressReleases/Pages/Mayor-announces-temporary-suspension-of-AWWU-and-MLP-utility-shutoffs.aspx.

[54] American Water Works Association, "The Financial Impact of the COVID-19 Crisis on U.S. Drinking Water Utilities," April 14, 2020, p. 21, https://www.awwa.org/Portals/0/AWWA/Communications/AWWA-AMWA-COVID-Report_2020-04.pdf.

January. In addition, after years of negotiations, the United Kingdom finalized Brexit negotiations and withdrew from the European Union on January 31, 2020.

On March 11, 2020 the World Health Organization declared the COVID-19 outbreak was a pandemic.[55] In response, many governments around the world strived to limit the health and economic impacts of the pandemic. In the U.S., state and local governments issued stay-at-home orders beginning in mid-March and encouraged people to practice social distancing. Large portions of the economy suddenly shut down which, so far, has resulted in over 56 million people in the U.S. filing unemployment claims since March 21.[56] To address the economic impacts, the U.S. Federal Government passed the $2.1 trillion CARES Act on March 27, 2020,[57] which is an economic stimulus package approximately 60% larger than the U.S. Government's 2019 discretionary spending budget.[58] The U.S. Federal Reserve cut its policy rate twice in March to its current level of 0 to 0.25 percent—a level last seen in the global financial crisis.[59] The U.S. Federal Reserve also announced "unlimited" quantitative easing and emergency liquidity programs to support financial markets. This has increased the Federal Reserve's balance sheet to a record high of over $7 trillion.[60]. Despite this, business activity has slowed substantially. 1st and 2nd quarter 2020 GDP decreased by an annual rate of 5.0% and 31.7%, respectively, according to the

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55 World Health Organization, "WHO Director-General's opening remarks at the media briefing on COVID-19 – 11 March 2020", press release, March 11, 2020. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

56 U.S. Department of Labor, "Unemployment Insurance Weekly Claims," News Release, September 3, 2020.

57 The White House, "Statement by the President," March 27, 2020, accessed April 16, 2020, https://www.whitehouse.gov/briefings-statements/statement-by-the-president-38/.

58 Congressional Budget Office, "10 Year Budget Projections – March 2020", accessed March 31, 2020, https://www.cbo.gov/about/products/budget-economic-data

59 U.S. Federal Reserve, "Federal Reserve Announces Extensive New Measures to Support the Economy," Press Release, March 23, 2020.

60 Reuters, "BRIEF – Fed balance sheet now tops $7 trillion," *Reuters*, May 21, 2020, accessed May 28, 2020, https://www.reuters.com/article/brief-fed-balance-sheet-now-tops-7-trill/brief-fed-balance-sheet-now-tops-7-trillion-idUSN9N2BX001

Bureau of Economic Analysis (BEA). [61] In August, the Federal Reserve announced a policy shift whereby they will target inflation averaging 2% over time, indicating interest rates could remain lower for some time.[62]

Q23. What are expectations going forward?

A23. The extent and length of the economic recovery from COVID-19 are as of yet unknown. The impact to GDP and unemployment will depend on how long social distancing measures remain in place and how long lingering consumption and behavioral changes persist. Currently, most economists expect a severe near-term negative impact to GDP with recovery in 2021. Blue Chip Economic Indicators' ("BCEI") August 2020 survey expects nominal GDP to contract by 4.3% in 2020 but forecasts the economy to recover by 5.3% in 2021.[63] Similarly, the Congressional Budget Office ("CBO") estimates that nominal 2020 GDP will decline by 5.7% before recovering in 2021 when GDP will increase by 6.2%.[64] In the same report, the BEA estimates that the unemployment rate will remain elevated for the next few years with the rate reaching 5.9% by 2023-2024. As of October 2020, BCEI have updated the 2020 contraction to 3.0 percent and estimate a growth of 5.5 in 2021 and 4.8 percent in 2022.[65] The extent of the impacts from the pandemic are just now becoming apparent—such as record unemployment and decreases in economic activity—and such impacts may persist for the near to medium-term. The longer-term impacts on consumer behaviors and investors' risk perceptions are yet to be determined.

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[61] Bureau of Economic Analysis, "Gross Domestic Product, 2nd Quarter 2020 (Second Estimate); Corporate Profits, 2nd Quarter 2020 (Preliminary Estimate)," U.S. Department of Commerce, August 27, 2020. Accessed September 1, 2020, https://www.bea.gov/news/2020/gross-domestic-product-2nd-quarter-2020-second-estimate-corporate-profits-2nd-quarter.

[62] U.S. Federal Reserve, "Federal Open Market Committee announces approval of updates to its Statement on Longer-Run Goals and Monetary Policy Strategy," August 27, 2020, accessed September 10, 2020, https://www.federalreserve.gov/newsevents/pressreleases/monetary20200827a.htm.

[63] Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, August 2020, pp. 2-3.

[64] Congressional Budget Office, "An Update to the Economic Outlook: 2020 to 2030," U.S. Department of Commerce, July 2020. Accessed September 1, 2020, https://www.cbo.gov/publication/56465. Nominal GDP to decline by 5.7% in 2020 and recover by 6.2% in 2021.

[65] Blue Chip Economic Indicators, October 10, 2020, pp. 2, 3 and 14.

Q24. How do these events impact the cost of equity estimation for AWU and ASU?

A24. It is important to remember that the cost of equity and capital structure established for AWU and ASU in this proceeding are expected to be in effect beyond the current extraordinary economic impacts of the COVID-19 pandemic. The analysis and recommendations should reflect expected market conditions and not exclusively the current market conditions. As discussed further below in this section, many of the input parameters to the cost of equity estimation methodologies are currently at unprecedented levels. Sole reliance on current economic conditions to anchor AWU and ASU's cost of equity or capital structure would unfairly lock AWU, ASU, and their customers into the current extraordinary economic conditions. Doing so would also not provide a fair return, especially when compared to other utilities that did not undergo a cost of capital proceeding during this period. At the same time, the current market conditions create an exorbitant amount of uncertainty and if the financial crisis can be used as a guide, investors' heightened perceptions of risk is likely to linger.[66] To this end, I have analyzed AWU's and ASU's cost of equity under two sets of assumptions, including one that reflects the current heightened financial and economic uncertainties. As the economy begins to reopen and recover, economic and financial uncertainty is expected to decline. Therefore, these two analyses provide a reasonable range of cost of equity estimates, which reflect the expected economic and financial conditions that will prevail in 2021-22, the relevant regulatory period of this proceeding.

A. INTEREST RATES

Q25. How do interest rates affect the cost of equity?

A25. The current interest rate environment affects cost of equity estimation in several ways. Most directly, the Capital Asset Pricing Model (CAPM) takes as one of its inputs a measure of the risk-free rate (see Figure 2). The estimated cost of equity using the CAPM decreases

[66] See, for example, Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Review of Models," *Federal Reserve of New York*, 2015. The authors show that not only did the MRP increase dramatically during the financial crisis of 2008-09, but the effect lingered through 2012-13 showing that a disruption to financial markets can linger for a long time.

(increases) by one percentage point when the risk free rate decreases (increases) by one percentage point. Therefore, to the extent that prevailing government yields are depressed due to economic uncertainties related to COVID-19 or the monetary policy responses, using current yields as the risk-free rate will depress the CAPM estimate below what is representative of the forward-looking cost of equity, which will be in effect during the relevant regulatory period. Put another way, with current government bond yields downwardly biased due to flight-to-quality behavior by investors and "unlimited" quantitative easing programs by the U.S. Federal Reserve, using current yields in the CAPM will also downward bias the cost of equity estimate. To avoid such a bias it is important to use a forecasted risk-free rate and consider whether the rate needs to be normalized (or the risk premium investors require needs to be adjusted) to ensure the resulting CAPM estimate reflects a non-biased estimate of AWU's and ASU's cost of equity over the relevant regulatory period. As the economy begins to recover, as forecasted, in 2021, which is prior to the start of the projected period in which rates will be in effect, interest rates are expected to increase from current lows. Therefore, the allowed fair return on equity for utilities should reflect the future interest rate environment.

Q26. What are the relevant developments regarding interest rates?

A26. Interest rates are currently near historic lows due to flight-to-quality behaviors by investors as well as the Federal Reserve's expansion of its quantitative easing programs. Interest rates on 10-year U.S. Government bonds were at 1.86% at the end of 2019.[67] As large parts of the economy began to shut down in response to the pandemic, investors fled riskier assets for safer assets. This demand for U.S. government bonds caused bond yields to decrease rapidly. On March 9, 2020, the entire U.S. yield curve fell below 100 bps for the first time in history and the 10-year U.S. government bond yield hit a record low of

[67] Bloomberg as of September 1, 2020.

0.339%.[68] Since then, long-term government bond yields have increased somewhat—10 year U.S. Government bond yields are currently at 0.875%.[69]

Most economists expect the economy to begin to recover in 2021.[70] This is expected to cause interest rates to rise from near-historic lows. Blue Chip Economic Indicators' ("BCEI") August 2020 edition forecasts that the yield on 10-year treasury bonds will increase to 1.0% by 2021.[71] I note that BCEI also projects the 10-year government bond yield will be 1.4% and 1.7% in 2022 and 2023, respectively, in their most recent long-term forecast (as of October 2020).[72] That is, the consensus forecast is that the yield on long-term treasury bonds will double over the next few years. The expectations for 2021 and onward are what is relevant for this proceeding as rates are expected to be in effect starting in 2021. Because the risk-free rates are an input to several cost of equity estimation models, the relationship between current and forecasted risk-free rates is an important consideration.

B. YIELD SPREADS

Q27. Why are bond yield spreads relevant to your cost of equity analysis?

A27. Bond yield spreads (also called credit spreads) reflect the premium that investors demand to hold debt securities (specifically corporate bonds) that are not risk free. Analogously, the Market Risk Premium (MRP)—which is a key input to the CAPM cost of equity

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[68] Sunny Oh, "Treasury yield curve sinks below 1% after oil and coronavirus worries rout stocks," *Market Watch*, March 9, 2020, accessed March 31, 2020, https://www.marketwatch.com/story/30-year-treasury-yield-tumbles-below-1-after-oil-and-coronavirus-worries-rout-stocks-2020-03-09

[69] Bloomberg as of December 18, 2020.

[70] For example, Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, August 2020 collects real GDP growth data from 40 financial institutions, academic institutions and other entities –all of whom predict a positive growth for 2021 with an average of 3.8 percent.

[71] Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, August 2020, p. 3. The maturity premium for a 20-year treasury bond over a 10-year treasury bond is about 50 basis points.

[72] Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, October 2020, p. 14

estimation—represents the risk premium that investors require to hold equities rather than risk-free government bonds.

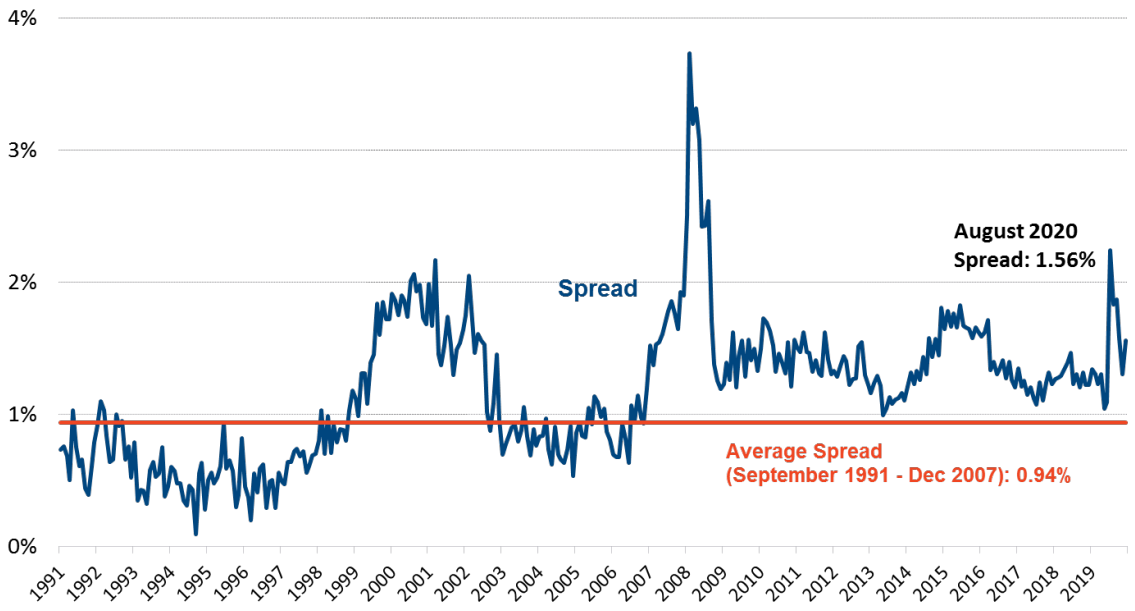
If bond yields are influenced to some extent by the same underlying market factors that drive the systematic risk premium for equities, shifts in directly observable credit spreads can assist with inference about changes in the MRP, which itself must be estimated.[73] More specifically, if both credit spreads and equity premiums are determined in part by the general premium required by investors for bearing systematic risk, then an increase in credit spreads may indicate an increase in the forward-looking MRP.

Q28. How does the current spread between utility and government bond yields compare to the historical spread?

A28. Utility bond yields have increased substantially recently as investors require additional compensation to hold non-government debt due to the increased business risks and economic uncertainties. As shown in Figure 11 below, spreads between 20-year A-rated utility bond yields and 20-year U.S. government bond yields are 1.56%, approximately 60 basis points above the pre-financial crisis average of 0.94%.

[73] This is the same issue as in cost of capital estimation more generally: the cost of debt can often be directly observed in the form of market bond yields, whereas the cost of equity must be estimated based on financial models.

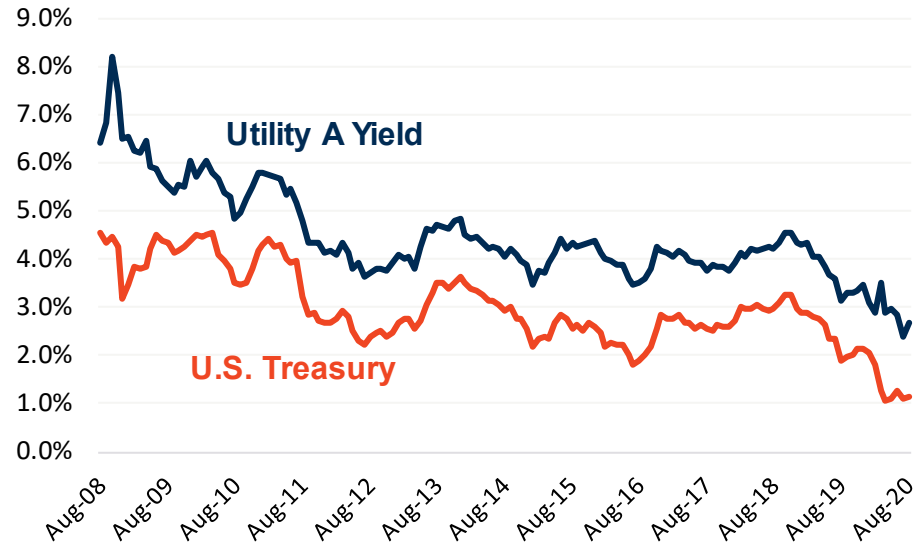
Figure 11 - Yield Spread Between Utility A-rated Bonds Yields and 20 Year U.S. Treasury Bonds



Source: Bloomberg as of 8/31/2020.

The yield spread is commonly thought to be explained by default risk, taxes, downward pressure on government bond yields due to monetary policy, or the equity risk premium. Hence, an increase in the spread could be caused by any or all of these components. As the default risk has generally not changed and taxes are generally a very small portion of the spread, the remaining components: downward pressure and the equity risk premium must explain the majority of the spread increase. Figure 12 below illustrates that the increased spread is attributable both to lower yields on government bonds and also an increased premium required by investors to hold riskier assets.

Figure 12 - Utility A-Rated Bond Yields and 20 Year U.S. Treasury Yields



Source: Bloomberg, data as of August 31, 2020.

While spreads have narrowed since the height of the COVID-19 pandemic in March and April, they remain elevated compared to the pre-COVID-19 period indicating lingering uncertainty and elevated risk. On April 2, 2020, S&P Global Ratings downgraded the outlook for North American utilities from "stable" to "negative" due to COVID-19 risks, citing concerns about the adequacy of utilities' financial cushions to weather the financial downturn.[74] With heightened concern about utility credit, spreads and risk premiums are likely to remain elevated.

C. RISK PREMIUMS

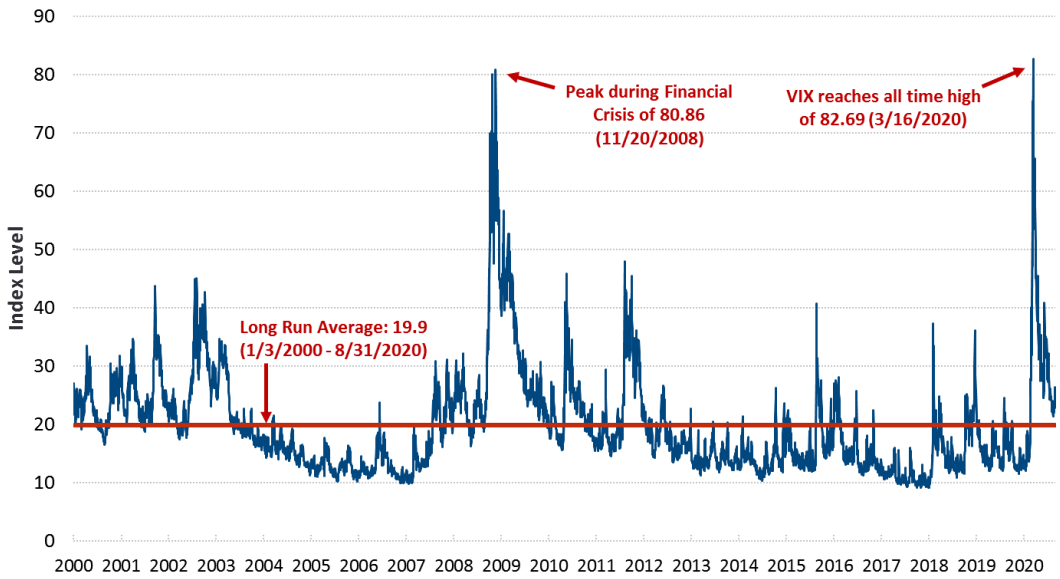
Q29. What is the current evidence regarding market volatility?

A29. Recently, financial markets have become extremely volatile as shown in near-term common volatility measures, such as the VIX, which is frequently referred to as the

[74] *S&P Global Market Intelligence*, "S&P lowers North American utilities outlook to negative on coronavirus risk," April 2, 2020, Accessed April 3, 2020, https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/s-p-lowers-north-american-utilities-outlook-to-negative-on-coronavirus-risk-57886477.

market's fear index. The VIX reached an all-time high of 82.69 on March 16, 2020, which was higher than the peak of 80.86 during the Financial Crisis. Although, the VIX has slowly retreated from recent highs to 21.57[75], it remains elevated relative to the long run average of 19.9. Comparably, at the time of the Commission's Order in Case No. U-19-005 and U-19-006 (February 25, 2020), the VIX stood at approximately 27.85 although the VIX was substantially lower at the time evidence in the matter was filed.[76] Clearly, investors are faced with substantially higher volatility today than during AWU's and ASU's recent rate cases and higher volatility implies a higher risk premium.

Figure 13 - VIX



Source: Bloomberg as of 8/31/2020.

Similarly, the SKEW index, which measures the market's willingness to pay for protection against negative "black swan" stock market events (*i.e.*, sudden substantial downturns),[77] shows that investors are cautious. A SKEW value of 100 indicates outlier returns are unlikely, but as the SKEW increases, the probability of outlier returns becomes more

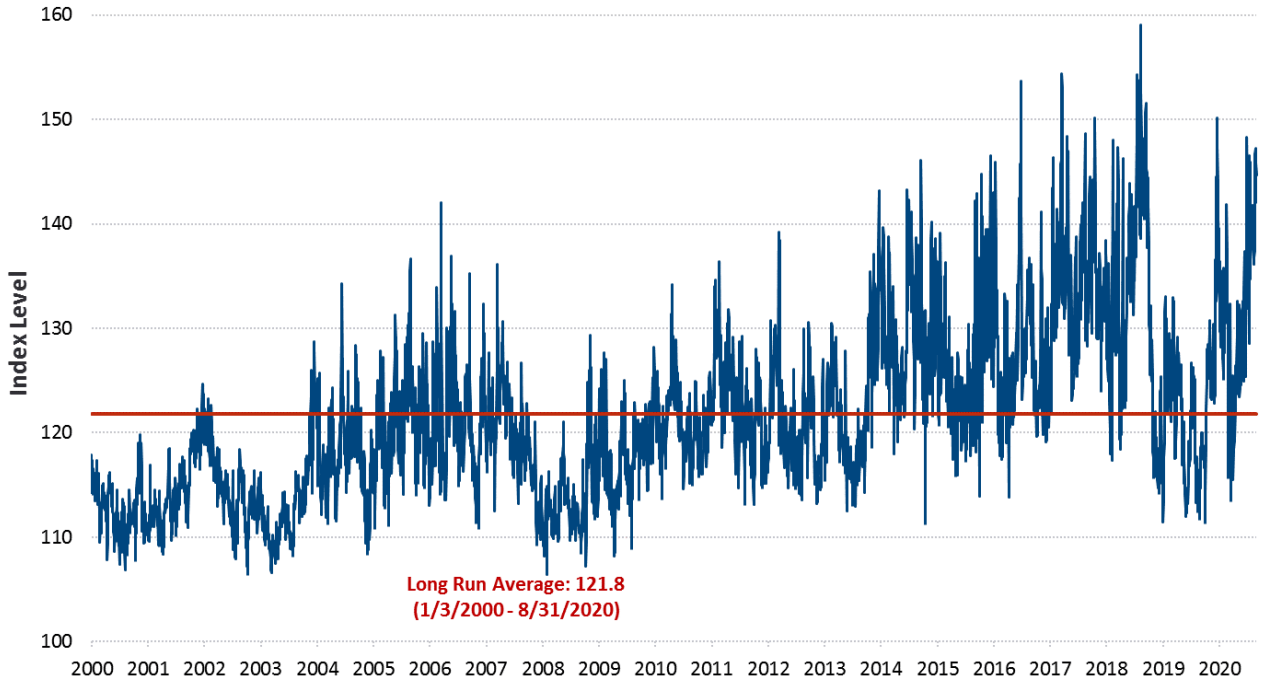
[75] Bloomberg, as of December 18, 2020.

[76] For example, at the time my rebuttal evidence in the matter was filed (October 2019), the VIX averaged 15.5 (during October 2019).

[77] For example, http://www.cboe.com/products/vix-index-volatility/volatility-indicators/skew.

significant. Figure 14 below shows the development in the SKEW since 2000 and that the index has recently increased following a period of declining SKEW. The index spiked to 148.3 on June 30, 2020, which is 26.5 points above its long run average of 121.8. The recent spike in the SKEW shows that investors are willing to pay for protection against downside risks.

Figure 14 - SKEW



Source: Bloomberg as of 8/31/2020.

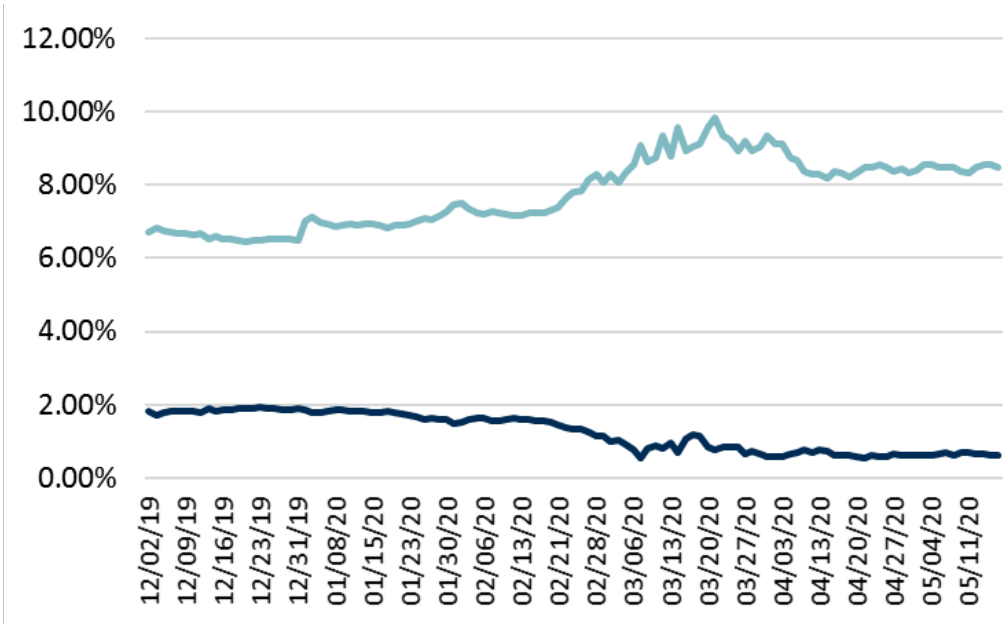
The currently very high level of both the VIX and SKEW is consistent with day-to-day observations of volatile financial markets and shows that investors are cautious about investing in equity. Such circumstances lead investors to require a higher premium to invest in assets or financial instruments that are not risk-free.

Q30. Can you explain the current evidence related to the market equity risk premium?

A30. The heightened volatility has increased the premium that investors require to hold risky assets, especially when measured based on forward-looking methodologies that estimate

expected market returns with reference to current dividend yields. Bloomberg's estimate of the market equity risk premium ("MRP") for the U.S. has increased to as high as 9.84% and is currently at 7.85%.[78] At the same time, the market equity risk premium that results from FERC's methodology increased to 9.16% as of the end of August 2020 using the methodology outlined in FERC Order 569-A.[79] This is consistent with an increase in the MRP of 60-110 basis points relative to the historical average.[80]

Figure 15 - Bloomberg's Daily Market Equity Risk Premium and Risk Free Rate



Q31. Are higher equity risk premiums relevant given that treasuries are near historic lows?

A31. Yes—this is highly relevant for cost of equity estimation as current risk-free rates are extremely low. On March 9, 2020, the entire U.S. yield curve settled below 1.00% for the first time in history.[81] Since then, U.S. Government bond yields have increased somewhat

[78] Bloomberg, November 30, 2020, accessed December 18, 2020. Measured over 10 Year U.S. Treasury bond.

[79] FERC Opinion No. 569-A, Docket No. EL14-12-004, EL15-45-013, May 21, 2012 FERC Order On Rehearing; see also attached workpaper.

[80] The long-term historical average arithmetic MRP as calculated by Duff & Phelps using the Ibbotson method is 7.14 percent. Source: Duff & Phelps 2019.

[81] According to the Federal Reserve, the yield on the 10-year, 20-year, and 30-year Treasury bonds on March 9, 2020 was 0.54%, 0.87%, and 0.99% respectively. These yields have since increased slightly.

with the 20-year and 30-year bond yields at or slightly above 1.00%. This decrease in bond yields has occurred as investors fled to safer assets due to the heightened market uncertainty. As shown above in Figure 15, the market equity risk premium has also increased as risk-free rates decreased.

Further, as shown in both academic and industry analyses, the allowed risk premium over the risk-free rate is inversely related to the risk-free rate. For example, Villadsen *et al.* (2017) found that the allowed risk premium increases by approximately 0.44% for each 1% decline in the risk-free rate.[82] Morin finds that the risk premium increases by 0.52% for each 1% decline in the risk-free rate.[83] Thus, the risk premium is likely to increase as the risk-free rate declines. This phenomenon is also documented in the forward-looking market risk premium calculated by Bloomberg. According to Bloomberg, the current market risk premium is 7.85 percent,[84] which is substantially higher than the historical average MRP of about 7.15 percent. It is also an increase over the forward-looking MRPs at the end of 2019, which were much more in line with the historical average MRP.

Q32. Is there evidence that the MRP will remain elevated going forward?

A32. Yes. In 2015, Duarte and Rose of the Federal Reserve of New York performed a study that aggregated the results of many models of the required MRP in the United States and tracked them over time.[85] This analysis found a very high MRP after the financial crisis, relative to time periods prior the crisis.

Source:https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield

82 Bente Villadsen, Michael J. Vilbert, Dan Harris, and A. Lawrence Kolbe, "*Risk and Return for Regulated Industries*," Academic Press, 2017, pp. 118-119.

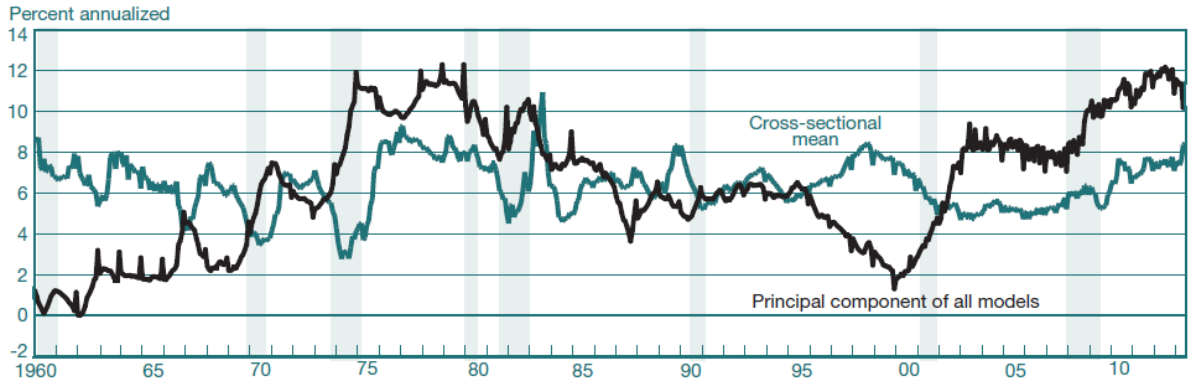
83 Roger A. Morin, "*New Regulatory Finance*," Public Utilities Reports, Inc., 2006, pp. 123-125.

84 Bloomberg, as of November 30, 2020 over a 10-year U.S. Government Bond, accessed December 18, 2020.

85 Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Review of Models," *Federal Reserve Bank of New York*, December 2015 ("Duarte and Rosa, 2015")
https://www.newyorkfed.org/research/staff_reports/sr714.html.

The authors estimated the MRP that resulted from a range of models each year from 1960 through the time of their study. The authors then reported the average as well as the first principal component of the results.[86] The authors found that the models used to determine the risk premium were converging to provide comparable estimates and that the average annual estimate of the MRP had reached an all-time high in 2012-2013. (Figure 16 below is a copy of the summary chart from Duarte and Rosa's 2015 paper). These directional trends identified by Duarte and Rosa are reasonably consistent with those observed from Bloomberg and they further support the proposition that the elevation of the MRP over its historical pre-crisis levels was a persistent feature of capital markets in the time following the financial crisis. Specifically, the financial crisis saw high volatility and a flight to quality – just as today. Therefore, it is reasonable to expect that the current MRP will remain elevated compared to historical levels, especially given the uncertainty related to the extent of economic and financial impacts from COVID-19.

Figure 16 - Duarte and Rosa's Chart 3
One-Year Ahead MRP and Cross-Sectional Mean of Models



[86] Duarte and Rosa emphasize the "first principal component" of the 20 models. This means that the authors used statistics to compute the weighted average combination of the models that captures the variability among the 20 models over time.

Q33. Please summarize how the economic developments discussed above have affected the return on equity and debt that investors require.

A33. Utilities rely on investors in capital markets to provide funding to support their capital expenditure program and efficient business operations. Investors consider the risk return tradeoff in choosing how to allocate their capital among different investment opportunities. It is therefore important to consider how investors view the current economic conditions; including the plausible development in the risk-free rate and the growth in GDP.

These investors have been dramatically affected by the ongoing market volatility, so there are reasons to believe that their risk aversion remains elevated relative to pre-COVID-19 levels.

As AWU and ASU are expected to be compensated as a utility on the equity component of its rate base, the same factors would affect AWU and ASU's equity.[87]

V. Analyzing the Cost of Equity

A. APPROACH

Q34. Can you explain your approach to estimating the cost of equity for AWU and ASU in the current environment?

A34. As discussed in Section IV, the current extraordinary financial and economic uncertainty related to COVID-19 has led to increased risk perception by investors which has impacted the inputs and assumptions that are used in cost of equity estimation methodologies. It is important to remember that AWU's and ASU's cost of equity and capital structure established in this proceeding will be in effect starting in 2021. As a result, I estimated AWU's and ASU's cost of equity using two sets of CAPM implementations, both of which use inputs and assumptions as of the end of August 2020. The first implementation of the CAPM/ECAPM (the "Traditional Approach") is intended to capture longer-term financial

[87] AWU's and ASU's ability to raise debt capital may differ from that of an investor-owned utility in that the utility has access to government loans. However, the availability of such loans and the interest rate therein will change over time.

and economic trends and therefore uses traditional inputs and assumptions. The second is a modified implementation of the CAPM/ECAPM ("Current Conditions Approach") that uses inputs and assumptions that reflects the heightened financial and economic uncertainty due to the on-going COVID-19 pandemic by relying on nearer-term inputs and assumptions, such as shorter-term betas.

I rely on both sets of analyses to determine a reasonable and fair return on equity for AWU and ASU. Given the substantial impacts that COVID-19 has already had on the economy and financial markets, AWU's and ASU's return on equity should certainly be higher than it was at the beginning of the year. However, as the economy begins to recover and progress is made on treatments and distribution of a vaccine for COVID-19, risk is expected to decrease from current levels. Therefore, the results of these analyses serve to establish a reasonable range of expected economic and financial conditions to determine a cost of equity recommendation.

Q35. Can you further describe your two approaches to estimating the cost of equity?

A35. The two approaches both analyze AWU's and ASU's cost of equity using the CAPM/ECAPM.[88] In addition, both approaches rely on the same set of regulated water utilities in my proxy group.

The key difference is that the two CAPM/ ECAPM approaches are meant to capture longer-term market trends (Traditional Approach) and the heightened financial and economic uncertainty due to COVID-19 (Current Conditions Approach). The Traditional Approach utilizes five years of weekly betas sourced from Value Line to reflect traditional capital market conditions. In this approach I rely upon both the long-term historic MRP from Duff & Phelps and also Bloomberg's forecasted MRP.

[88] I also utilize the DCF and Risk Premium approach as of August 31, 2020. However, I have not utilized a modified implementation of either. See Section V.D and Section V.E, as well the Dr. Villadsen Technical Appendix for further discussion of the implementation of these models.

In my second approach I take into consideration that the systematic risk of utilities (beta) has increased by 45% relative to their historical levels and that of early 2020.[89] Therefore, in my Current Conditions Approach, I use six months of daily betas from Bloomberg. This allows me to capture change in systematic risk since the onset of COVID-19. Using six months of daily betas allows me to have enough observations to ensure that the betas are statistically meaningful while only capturing recent changes in the systematic risk. I combine these daily betas with the forecasted MRP from Bloomberg.

In the remainder of Section V, I present the inputs, assumptions, and results from both cost of equity estimation approaches.

B. SAMPLE SELECTION

Q36. How do you identify sample companies?

A36. AWU is a regulated water utility and ASU is a regulated wastewater utility, so I start with the universe of publicly traded utilities classified as water utilities in Value Line. I require that the companies have an investment grade credit rating, no recent dividend cuts, and generally have data available for estimation.[90]

Q37. What are the characteristics of the Water Utility sample?

A37. The water utility sample comprises water utilities whose primary source of revenues and majority of assets are subject to regulation. The final sample consists of the water utilities listed in Figure 17 below. These companies own regulated water and wastewater utility subsidiaries in many states. Therefore, the sample is broadly representative of the regulated water and wastewater industry from a business risk perspective.

Figure 17 reports the sample companies' annual revenues for the most recent four quarters as of Q2 2020 and also reports the market capitalization, credit rating, beta and growth rate.

[89] Bloomberg, as of August 31, 2020.

[90] Commonly, I also eliminate companies with merger and acquisition activity as well as smaller entities with limited trading activity.

I note that compared to the sample companies included in Order 10,[91] American Water Works has been added because it now has data available for analysis. At the time the data that led to Order 10 was obtained, American Water had just started trading and therefore had very limited market data available for analysis.

The sample consists of companies that Value Line classifies as water utilities except Consolidated Water, which is a developer and operator of desalination plants rather than a utility.

[91] Regulatory Commission of Alaska (RCA) Order No. 10, Dockets U-08-157 and U-08-158 (Order 10), February 11, 2020.

Figure 17 - Characteristics of Water Utility Sample

Company	Annual Revenues (USD million)	Regulated Assets	Market Cap. 2020 Q2 (USD million)	Betas	Bloomberg Credit Rating (2020)	Long Term Growth Est.
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	$478	R	$2,849	0.65	A+	5.6%
Amer. Water Works	$3,690	R	$23,013	0.85	A	7.3%
Artesian Res Corp	$85	R	$294	0.70	A	4.0%
California Water	$710	R	$2,255	0.65	A+	12.6%
Global Water Resources Inc	$37	R	$236	0.70	A	15.0%
Middlesex Water	$138	R	$1,168	0.70	A	3.6%
SJW Corp.	$503	R	$1,757	0.80	A-	15.5%
York Water Co. (The)	$53	R	$600	0.80	A-	5.6%
Average	$712		$4,022	0.73	A	8.6%

Sources and Notes:
[1]: Bloomberg as of August 31, 2020. Most recent four quarters available at the time of access to Bloomberg.
[2]: See Table No. BV-WATER-2. Key:
R - Regulated (More than 80% of assets regulated).
[3]: See Table No. BV-WATER-3 Panels A through J.
[4]: See Supporting Schedule # 1 to Table No. BV-WATER-10.
[5]: Bloomberg Credit Ratings as of August 31, 2020 as of 2020 Q3.
[6]: See Table No. BV-WATER-5.

Q38. How does the water utility sample compare to AWU and ASU?

A38. The sample consists of eight (8) companies with operations concentrated in the regulated water and wastewater industry. As for a comparison to AWU and ASU the sample companies are larger than AWU and ASU. AWU and ASU currently have a slightly higher bond rating than the average sample company. However (1) AWU / ASU and the sample companies are all highly rated and (2) bond ratings measure the bond default risk rather than the cost of equity. Therefore, the impact of a slightly higher bond rating is simply that AWU and ASU have slightly lower bond default risk than the average sample company,[92] which may be reflected in lower interest rates, which benefits customers. It does not, however, affect the cost of equity.

[92] See Footnote 29 and Figure 17.

Finally, while the sample companies are investor-owned and publicly traded companies, AWU and ASU are each part of AWWU, a municipally-owned entity that does not have publicly traded stock.[93]

Q39. Does the availability of the PRISM affect AWU's or ASU's risk relative to the sample companies?

A39. No. As shown in Figure 18 below, it is clear that American Water Works, Artesian Resources, Middlesex Water, and York Water have PRISM-like mechanisms in the majority of their jurisdictions.[94] The only companies that do not have a PRISM-like mechanism are American States, California Water, and Global Water Resources. Thus, the majority of the sample companies have a PRISM-like mechanism. In addition, while California does not have a PRISM-like mechanism, it does have a different type of utility plant recovery mechanism and several other rider mechanisms.[95] Therefore, mechanisms similar to the PRISM are available to the majority of the sample companies and not a distinguishing factor.

[93] As a result of being a municipally-owned entity, AWU and ASU follow GAAP and GASB while the sample companies follow GAAP; additionally AWU and ASU have access to low interest loans from the State of Alaska, which are reflected in rates through lower cost of debt.

[94] SJW also has PRISM-like mechanisms, although not in the majority of its jurisdictions.

[95] California Water, 2019 10-K, February 27, 2020, p. 8.

Figure 18 - Prevalence of Infrastructure Recovery Mechanisms Among Sample Companies[96]

Sample Company	% of Revenue/Rate Base With Infrastructure Recovery Mechanism
Amer. States Water	0%
Amer. Water Works	>=80%
Artesian Res Corp	97%
California Water	0%
Global Water Resources Inc	0%
Middlesex Water	100%
SJW Corp.	40%
York Water Co. (The)	100%

Source: Company 10Ks and Investor Presentations September 2020

Q40. Are there any differences in the regulatory environment in which the comparable companies and AWU /ASU operate?

A40. While all jurisdictions to a degree are unique, I note that while Anchorage is more urbanized and faces less extreme weather than much of Alaska, the state of Alaska is unique in that it is much more thinly populated, and faces difficulties engaging in construction for a substantial part of the year, which makes some main and pipe replacements challenging. Alaska, unlike many states in the West, does not face water supply difficulties.

As for the specific risks that face AWU and ASU, I noted above the very high level of CIAC and a much higher than average debt level. I also note that at least one of ASU's wastewater treatment facilities currently operates under an administrative extension of a permit that has expired. ASU's largest wastewater treatment plant, Asplund, is permitted under a provision of the Clean Water Act, Section 301(h). Operation of the plant as a primary treatment facility is dependent on continuation of the ability to operate under the Section 301(h) permit modification. If the modification is not renewed, secondary or possibly tertiary treatment of the wastewater may be required, which would require

[96] For details, see Exhibit BV-05, p. 3.

significant upgrades to the Asplund treatment facility. This is further discussed in the pre-filed direct testimony of Mr. David A. Persinger P.E.

C. THE CAPM BASED COST OF EQUITY ESTIMATES

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 2 in Section III), 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, S (e.g., a particular common stock), is given by the following equation:

$$\boldsymbol{r_s = r_f + \beta_s \times MRP} \qquad (1)$$

where $\boldsymbol{r_S}$ is the cost of capital for investment S;

$\boldsymbol{r_f}$ is the risk-free interest rate;

$\boldsymbol{\beta_S}$ is the beta risk measure for the investment S; and

$\boldsymbol{MRP}$ is the market equity risk premium.

The CAPM is a "risk-positioning model" that relies on the empirical fact that investors price risky securities to offer a higher expected rate of return than safe securities. It says that an investment whose returns do not vary relative to market returns should receive the risk-free interest rate (that is the return on a zero-risk security, the y-axis intercept in Figure 2). 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: the risk premium on a value-weighted portfolio of all investments, which by definition has average risk.

1. Inputs to the CAPM

Q42. What inputs does your implementation of the CAPM require?

A42. As demonstrated by equation (1), estimating the cost of equity for a given company requires a measure of the risk-free rate of interest and the market equity risk premium (MRP), as well as a measurement of the stock's beta. There are many methodological choices and sources of data that inform the selection of these inputs. I discuss these issues, along with the finance theory underlying the CAPM, in Exhibit BV-02 to this written testimony. As previously discussed, I performed multiple CAPM calculations corresponding to distinct "scenarios" reflecting different values of the inputs. This allowed me to derive a range of reasonable estimates for the cost of equity capital implied by each of my samples.

Q43. What values did you use for the risk-free rate of interest?

A43. I used the yield on a 20-year Government Bond as the risk-free asset for purposes of my analysis. Recognizing the fact that the cost of capital set in this proceeding will be in effect starting in 2021 and perhaps for years thereafter, I rely on a forecast of what Government bond yields will be one year out. Specifically, Blue Chip predicts that the yield on a 10-year Government Bond will be 1.0% by 2021.[97] I adjust this value upward by 50 basis points to reflect the historical maturity premium for the 20-year over the 10-year Government Bond.[98] This gives me a risk-free rate of 1.5%.[99]

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[97] Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, Consensus Forecasts, August 2020.

[98] This maturity premium is estimated by comparing the average excess yield on 20-year versus 10-year Government Bonds over the period 1990 - 2020, using data from Bloomberg.

[99] As noted above, the Blue Chip Economic Indicators, October 2020 forecast a 10-year risk-free rate of 1.4 percent for 2022, so that the 20-year risk-free rate would be approximately 1.9 percent.

Additionally, it is important to recognize the implication of higher spreads between utility bond yields and U.S. Government bond yields. As of the end of August, this spread is approximately 0.47% higher than it was prior to the 2008 financial crisis. One explanation of this is that prevailing government bond yields are depressed relative to longer-term market expectations due to monetary policy and flight-to-quality behaviors by investors. Therefore, I also consider a scenario in which the appropriate risk-free rate is conservatively 0.25% higher at 1.75%.

Q44. What values did you use for the market equity risk premium (MRP)?

A44. Like the cost of capital itself, the market equity 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 inferred or forecasted based on known market information. One commonly used method for estimating the MRP is to measure the historical average premium of market returns over the income returns on government bonds over some long historical period. *Duff and Phelps* performs such a calculation of the MRP. The average market risk premium from 1926 to the present (2019) is 7.15%.[100] I used 7.15% as the value of the historic MRP in my CAPM scenarios.

However, investors may require a higher or lower risk premium, reflecting the investment alternatives and aggregate level of risk aversion at any given time. As explained in Section IV, there is evidence that investors' level of risk aversion is elevated relative to the time before the COVID-19 pandemic and may remain elevated for some time, even after the pandemic. In recognition of the evidence that forward-looking measures of expected market equity risk premium are higher than the long-term historical average, I also perform a CAPM calculation using Bloomberg's forecasted MRP of 7.22%.[101]

[100] See *Duff and Phelps 2020 Cost of Capital Navigator – U.S. Cost of Capital Module*.

[101] Bloomberg as of August 31, 2020

Q45. What betas did you use for the companies in your sample?

A45. In the Traditional Approach, I used Value Line betas, which are estimated using five years of weekly data, which is consistent with approach taken in Order 10.[102] In the Current Conditions Approach, I used Bloomberg betas, which are estimated using six months of daily betas. Using six months of daily betas allows me to capture changes in systematic risk due to the current market uncertainties while also having sufficient data points for statistically meaningful results.

2. The Empirical CAPM

Q46. Did you use any other CAPM-based model?

A46. Yes. Empirical research has shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: 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.[103] 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 second variation on the CAPM that I employed makes use of these empirical findings. It estimated the cost of capital with the equation,

$$\boldsymbol{r_S = r_f + \alpha + \beta_S \times (MRP - \alpha)} \qquad (2)$$

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 (2) above).

[102] Order 10 at 40.

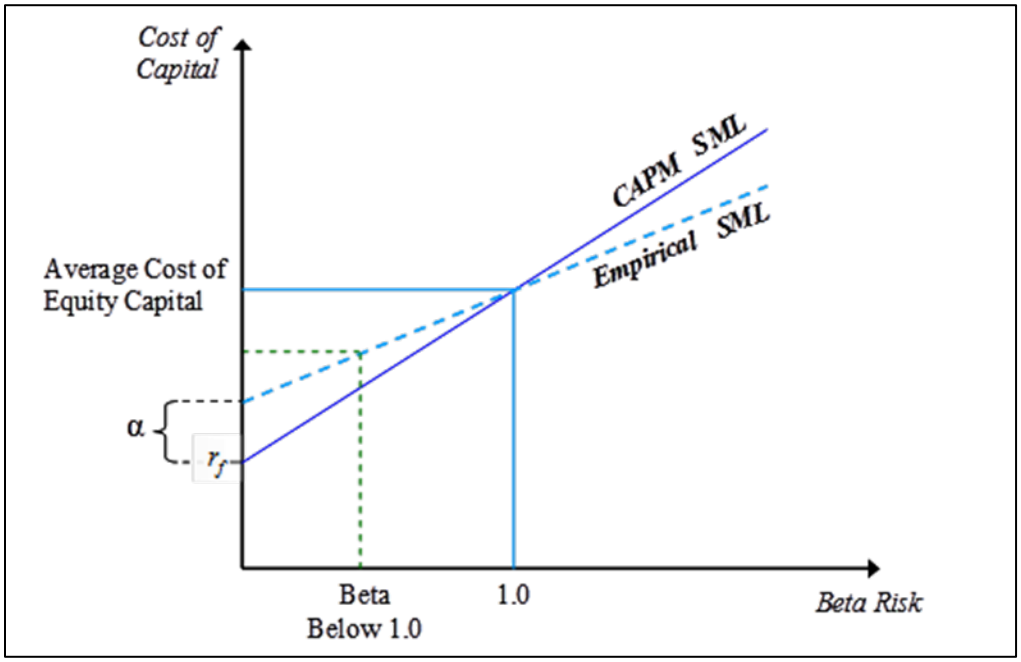
[103] See Exhibit BV-02, p. 13 for references to relevant academic articles.

I call this model the Empirical Capital Asset Pricing Model, or "ECAPM." The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line in Figure 2, which results in a Security Market Line that more closely matches the results of empirical tests. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

Q47. Why do you use the ECAPM?

A47. Research shows that the analysis performs better empirically, when paired with the ECAPM, which recognizes the consistent empirical observation that the CAPM underestimates the cost of capital for low beta stocks. In other words, 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. Exhibit BV-02 discusses the empirical findings that have tested the CAPM and also provides documentation for the magnitude of the adjustment, (α).

Figure 19 – The Empirical Security Market Line



3. Results from the CAPM Based Models

Q48. Please summarize the parameters you considered in your CAPM and ECAPM analyses.

A48. The parameters for the two scenarios are displayed in Figure 20 below. In my CAPM and ECAPM analyses, I consider two sets of scenarios based on the empirical observation that the yield spread is higher than normal as is the forecast MRP, as discussed above in Section IV. The increase yield spreads could reflect the increase in MRP or downward pressure on the yield of government bonds due to monetary policy and flight-to-quality behaviors. Therefore, I use an unadjusted historic average MRP with the increased estimate of the risk-free rate in one scenario; whereas, in the second scenario I use an unadjusted forecasted risk-free rate with a higher estimate of the MRP. To be conservative, I do not simultaneously normalize the risk-free rate and elevate the MRP.

Scenario 1 uses the forecasted 20 year U.S. Treasury rate for 2021 and then adjusted this to include half of the current spread between utility and Government bond yields. This results in a Scenario 1 risk-free rate of 1.75%. I pair this with the long-term average historic MRP of 7.15% as estimated by Duff & Phelps.

In my second scenario, I use an unadjusted risk-free rate based on the forecasted 20 year U.S. Treasury rate for 2021 of 1.50%. I then use Bloomberg's forecasted MRP of 7.22%.

Figure 20 – Risk Positioning Scenario Parameters

	Scenario 1	Scenario 2
Risk-Free Interest Rate	1.75%	1.50%
Market Equity Risk Premium	7.15%	7.22%

For each of the two scenarios, I implement a Traditional Approach using five-year weekly betas from Value Line and a Current Conditions Approach that relies on six-months of daily betas as estimated by Bloomberg.

Q49. Please explain the difference between the data relied upon to estimate the cost of equity and the regulatory rate base to which the cost of equity is applied.

A49. Both the CAPM and the DCF models rely on market data to estimate the cost of equity for the sample companies, so the results reflect the value of the capital that investors hold during the estimation period (market values). The allowed return on equity is applied to the fair value rate base, which could be financed differently than the sample companies.

Q50. Why is this difference important to the estimation of the cost of equity?

A50. Taking differences in financial leverage into consideration does not change the value of the rate base, but it does consider the fact that the more debt a company has, the higher the financial risk associated with an equity investment is.[104] To see this I constructed a simple example below, where only the financial leverage of a company varies. I assumed the return on equity is 11% at a 50% equity capital structure and determined the return on equity that would result in the same overall return if the percentage of equity in the capital structure were reduced to 36%.

Figure 21 – Illustration of Impact of Financial Risk on Allowed ROE

	Company A (50% Equity)	Company B (45% Equity)
Rate Base	$1,000	$1,000
Equity	$500	$360
Debt	$500	$640
Cost of Debt (5%)	$25	$32
Return on Equity	$55	$48
Total Cost of Capital (7.5%)	**$80**	**$80**
ROE / Implied ROE	11%	13.3%

[104] See Exhibit BV-02, pp. 14-20 for a description of common practice and underlying finance principles related to the impact of financial risk on the cost of equity.

The table in Figure 21 above illustrates how financial risk affects returns and also the allowed ROE: the overall return does not change, but the allowed ROE required to produce the same return goes up in recognition of the increased risk to equity investors caused by the higher degree of financial leverage.

The principle illustrated in Figure 21 is an example of the adjustments I performed to account for differences in financial risk when conducting estimates of the cost of equity applicable to a water or wastewater utility with 50 percent equity. I considered financial risk using several commonly used methods including the method commonly referred to as the Hamada method in textbooks[105] to avoid undue influence from any one set of assumptions.[106] The Hamada method looks to the equity beta that is estimated from market data and derives an equivalent asset beta that assumes the assets are financed 100% by equity. The method then re-levers the beta to be consistent with the capital structure relied upon by the target company. There are multiple versions of the Hamada method that are differentiated by the assumptions they make about the systematic risk of debt (e.g., debt betas) and the impact of taxes. To avoid unduly biasing the estimation by the specific assumptions, I estimate the cost of equity using three different methods: (1) as in Figure 21 above, I assume the overall cost of capital remains constant regardless of capital structure, (2) I use the Hamada method assuming taxes are irrelevant, and (3) I use the Hamada method assuming taxes are relevant. As there is no consensus in the academic literature about which method is the most accurate in general, I present all three methodologies.

[105] See, for example, Berk & DeMarzo 2014, Chapter 14. A detailed explanation is also included in Exhibit BV-02, pp. 15-20.

[106] These methods include calculating the ROE implied by the overall cost of capital as illustrated in Figure 19, as well as two versions of the so-called Hamada method for levering and unlevering betas in the CAPM and ECAPM. See Exhibit BV-02 for further discussion and detail.

Q51. Can you summarize the results from applying the CAPM-based methodologies?

A51. Yes. The results using a hypothetical capital structure of 50% equity presented in Figure 22 and Figure 23.[107]

Figure 22 – Water Utility Sample CAPM-Based Results – Traditional Approach

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Full Sample		
Financial Risk Adjusted Method		
CAPM	9.1%	10.8%
ECAPM (α = 1.5%)	9.7%	11.3%
Hamada Adjustment Without Taxes		
CAPM	9.0%	8.8%
ECAPM (α = 1.5%)	9.0%	8.8%
Hamada Adjustment With Taxes		
CAPM	8.6%	8.4%
ECAPM (α = 1.5%)	8.6%	8.4%

Sources and Notes:
Scenario 1: Risk Free Rate of 1.75%, Market Risk Premium of 7.15%.
Scenario 2: Risk Free Rate of 1.50%, Market Risk Premium of 7.22%.

[107] Tables and supporting schedules detailing my cost of capital calculations for Water Utility sample are contained in Exhibit BV-03.

Figure 23 – Water Utility Sample CAPM Based Results – Current Conditions

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Full Sample		
Financial Risk Adjusted Method		
CAPM	11.7%	13.3%
ECAPM (α = 1.5%)	11.8%	13.4%
Hamada Adjustment Without Taxes		
CAPM	11.6%	11.4%
ECAPM (α = 1.5%)	11.1%	10.8%
Hamada Adjustment With Taxes		
CAPM	11.0%	10.7%
ECAPM (α = 1.5%)	10.6%	10.3%

Sources and Notes:
Scenario 1: Risk Free Rate of 1.75%, Market Risk Premium of 7.22%.
Scenario 2: Risk Free Rate of 1.50%, Market Risk Premium of 7.22%.

In the Traditional Approach shown in Figure 22 the water and wastewater utility sample's CAPM-based results range from 8.4% to 11.3%. Whereas, the results from Current Conditions Approach, shown in Figure 24, range from 10.3% to 13.4%.[108] To ensure my range encompasses all possible aspects, I present the estimates with and without taxes, where "with taxes" scenario is a lower bound in that I assume statutory taxes. Consequently, the estimated cost of equity for a water / wastewater utility with 50% equity is presented using all three methods is fairly wide and range from 8.4% to 13.4%. However, if I focus on the CAPM that in the past has been preferred by the Commission and on the Hamada-based financial risk considerations, I find that the CAPM supports an ROE of 8.6% to 9.1% at 50% equity using Scenario I, while the Current Conditions Approach support a slightly higher range of 11.0% to 11.7% using Scenario I.[109]

[108] AWWU does not pay income taxes, but the comparable companies do. To be conservative, I report both the results with and without taxes noting that the "with taxes" results generally are lower. Also, AWWU does pay a Municipal Utility Service Assessment ("MUSA"), which is payment in lieu of taxes.

[109] The Commission has in the past relied on the CAPM and the historical arithmetic MRP; Order 10, p. 41.

D. THE DCF BASED ESTIMATES

1. Single- and Multi-Stage DCF Models

Q52. Can you 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 for the present value of a cash flow—literally 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:

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

Where $\boldsymbol{P_0}$ is the current market price of the stock;

$\boldsymbol{D_t}$ is the dividend cash flow expected at the end of period $\boldsymbol{t}$;

$\boldsymbol{T}$ is the last period in which a dividend cash flow is to be received; and

$\boldsymbol{r}$ 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 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 the growth rate lasts forever, so the formula can be rearranged 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:

$$\boldsymbol{r} = \frac{\boldsymbol{D_1}}{\boldsymbol{P_0}} + \boldsymbol{g} = \frac{\boldsymbol{D_0}}{\boldsymbol{P_0}} \times \boldsymbol{(1+g)} + \boldsymbol{g} \qquad (4)$$

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

Equation (4) says that if equation (3) holds, 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; it is also known as the Gordon Growth model. I note that this is the DCF model relied upon by the Commission in Order 10.[110]

Q53. Are there different 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).[111] One such alternative expands the Gordon Growth model to three stages. In the multistage model, earnings and dividends can grow at different rates, but must grow at the same rate in the final, constant growth rate period. [112]

A common implementation of the multi-stage DCF is to assume that companies grow their dividend for 5 years at the forecasted company-specific rate of earnings growth, the growth then tapering over the next 5 years toward the growth rate of the overall economy (i.e., the long-term GDP growth rate forecasted to be in effect 10 years or more into the future). Variations of this model have historically been used by me and others in a large number of jurisdictions and although I have utilized them, I consider many of the model's features problematic in the current environment. The model may combine two conservative elements: (1) The current dividend yield may be lower than expected going forward and (2) the current GDP forecast is much lower than both its historical average and that recently experienced. Thus, the combination of these two elements may lead to unusually low DCF

[110] Order 10, pp. 34-38.

[111] 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.

[112] See Exhibit BV-02, pp. 3-6 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.

estimates of the cost of equity. As a result, I believe the result merits less weight than the Gordon Growth model discussed above.[113] However, the model has the advantage of allowing for different growth rates at different future points.

Q54. What are the relative strengths and weaknesses of the DCF versus CAPM based methodologies for estimating the cost of equity capital?

A54. Current market conditions affect all cost of capital estimation models to some degree, but the DCF model has at least one advantage over the CAPM-based models as it includes contemporaneous stock prices and forward-looking growth, whereas the CAPM relies on historical data to estimate systematic risk and (in some cases) the market risk premium.

2. DCF Inputs and Results

Q55. What growth rate information did you use?

A55. 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 Thomson Reuters *IBES*, which is consistent with Order 10's reliance on analysts' forecasts from several public sources.[114] For the multi-stage version, I also use Blue Chip growth forecasts.

Additionally, I relied on the dividend yield of the companies, which I estimate using the most recently available dividend information (currently) and the average of the last 15 days of stock prices ending August 31, 2020.[115] As the single largest advantage of the DCF model is that it uses current market information, I find it is important to use a relatively short time period to determine the dividend yield – yet to avoid the bias caused by any one day. I believe a 15-day average accomplishes that goal. Because the stock price of utilities currently is higher than they historically have been and because some companies engage

[113] I include the estimation results to be consistent with my prior filing in e.g., U-19-005 and U-19-006.

[114] Order 10, p. 37 cites growth forecasts from Value Line, First Call, Zacks, and Reuters. I note that First Call / Reuter is now part of Thomson Financial and that Zacks obtain many of its forecasts from IBES.

[115] The Commission in Order 10 (p. 35) used a six month average – because it was the most current.

in share buybacks, the dividend yield underestimates the yield on cash distributions to investors.

Q56. Please address the input data in the DCF model.

A56. The Gordon Growth/single-stage DCF models require forecast growth rates that reflect investor expectations about the pattern of dividend growth for the companies over a sufficiently long horizon, but estimates are typically only available for 3-5 years.

One issue with the data is that it includes solely dividend payments as cash distributions to shareholders, while some companies also use share repurchases to distribute cash to shareholders. To the extent that companies in my samples use share repurchases, the DCF model using dividend yields will underestimate the cost of equity for these companies. While there are companies in my sample that have engaged in share buybacks in the past, the magnitude is currently not large.

A second issue is that the flight-to-quality has resulted in higher than usual stock prices for water utilities and hence lower than usual dividend yields. As a result, the dividend yield may be downward biased. The multi-stage DCF model additionally requires a measure of the long-term GDP growth.

Q57. What are the DCF based cost of equity estimates for the samples?

A57. The results are presented in Figure 24 below.[116] I note that the growth rates in the model (shown in Figure 17) range from 3.6% to 15.5% for the proxy sample. The average growth rate is about 8.6%.

[116] Tables and supporting schedules detailing my cost of capital calculations are included in Exhibit BV-03.

Figure 24 - DCF Results for Water Utility Sample

	Cost of Equity Estimates
Full Sample	
Single-Stage DCF	13.9%
Multi-Stage DCF	8.8%

In Order 10, the Commission emphasized the simple Gordon Growth model and I believe that it is a more reasonable estimate at the current time than the multi-stage DCF, which is impacted by both the relatively low dividend yields. As a result, I believe the multi-stage DCF is downward biased.

Q58. How do you interpret the results of your DCF analyses?

A58. The DCF model estimates range from 8.8% to 13.9%. The midpoint of this range is 11.4%, which is consistent with the upper end of my Traditional Approach CAPM results and the lower end of my Current Conditions CAPM results.

E. RISK PREMIUM MODEL ESTIMATES

Q59. Did you estimate the cost of equity that results from an analysis of risk premiums implied by allowed ROEs in past utility rate cases?

A59. Yes. In this type of analysis, sometimes called the "risk premium model", the cost of equity capital for utilities is estimated based on the historical relationship between allowed ROEs in utility rate cases and the risk-free rate of interest at the time the ROEs were granted. These estimates add a "risk premium" implied by this relationship to the relevant (prevailing or forecasted) risk-free interest rate:

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

Q60. What are the merits of this approach?

A60. First, it estimates the cost of equity from regulated entities as opposed to holding companies, so that the relied upon figure is directly applicable to a 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 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 implementation ensures that I can compare allowed ROE granted at different times and under different interest rate regimes.

Q61. How did you use rate case data to estimate the risk premiums for your analysis?

A61. The data comes from RRA's Water Advisory and cover the period 2007-2019, Q4.[117] 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 quarter.[118] I calculated the allowed utility "risk premium" in each quarter as the difference between allowed 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 parameters of the linear equation:

$$Risk\ Premium\ =\ A_0\ +\ A_1\ \times\ (Treausury\ Bond\ Yield) \qquad (5)$$

I derived my estimates of A_0 and A_1 using standard statistical methods (OLS regression) and find that the regression has a high degree of explanatory power in a statistical sense ($R^2=0.93$) and the parameter estimates, $A_0=0.0906$ and $A_1= -0.758$, are statistically

[117] The data source varied from what I have used in the past as RRA Water Advisory now has published a consistent series of data.

[118] I rely on the 20-year government bond to be consistent with the analysis using the CAPM and to avoid confusion about the risk-free rate. 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.

significant. 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. In the regression described above, the allowed ROE on average declined by less than 100 basis point when the government bond yield declined by 100 basis points. Based on this analysis, I find that the current market conditions are consistent with an ROE of 9.4 – 9.5%.

Figure 25: Risk Premium Model Estimates

	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:	1.75%	9.06%	-0.758	7.73%	9.5%
Scenario 2:	1.50%	9.06%	-0.758	7.92%	9.4%

Sources and Notes:
[1]: Blue Chip Economic Indicators Forecast for 10 year Treasury Bond in 2021, adjusted to 20 year horizon.
Scenario 1 includes 0.25% adjustment for yield spread between utility and government bonds.

It is important to recognize that the allowed ROE is granted on the equity portion of water utilities' rate base. The rate base is commonly measured using book value and the average allowed equity percentage is about 50%, so there is no need to consider financial leverage if an equity percentage of 50% is used.

Q62. What conclusions did you draw from your risk premium analysis?

A62. While the Commission did not rely on the risk premium models in Order 10 and the risk premium models based on historical allowed returns are not underpinned by fundamental finance principles in the manner of the CAPM or DCF models, I believe they can provide useful benchmarks for evaluating whether the estimated ROE is consistent with recent practice. My risk premium model cost of equity estimates demonstrate that the results of my DCF and CAPM analyses are in line with the actions of utility regulators. Because the risk premium analysis as implemented takes into account the interest rate prevailing during

the quarter the decision was issued, it provides a useful benchmark for the cost of equity in any interest environment.

VI. SUMMARY OF RESULTS

Q63. Please summarize your ROE evidence assuming a hypothetical capital structure with 50% equity.

A63. Assuming a hypothetical capital structure that includes 50% equity for ASU and using AWU's actual capital structure, I find the range of ROE results displayed in Figure 26 below.

Figure 26 - Range of ROE Estimates at 50% Equity

	Reasonable Range	Midpoint Estimate
CAPM – Traditional	8.6% - 9.1%	8.9%
CAPM – Current Conditions	11.0% - 11.7%	11.4%
DCF	8.8% - 13.9%	11.4%
Risk Premium	9.4% - 9.5%	9.45%
Average	9.5% - 11.0%	10.3%

I note that if I assign 40% weight to the CAPM and 60% weight to the DCF as in Order 10, then the ROE is approximately 10.4% using the Traditional Approach CAPM results and 11.4% using the Current Conditions results. The ROE is higher if only the single-stage DCF results are relied upon.[119] This figure is higher than what is supported by the risk premium analysis.

[119] Using only the single-stage DCF results, the weighted ROE is 11.9% using the Traditional Approach CAPM results and 12.9% using the Current Conditions results.

I believe that the multi-stage DCF deserves less weight than does the Gordon Growth model. Further, because ASU and AWU both face unique risks in the form of (i) their smaller size, (ii) a very high level of CIAC relative to other balance sheet items, and (iii) challenges earning their allowed ROEs, I believe that placing AWU and ASU at the midpoint is conservative.

Q64. Please summarize your findings regarding ASU's and AWU's capital structure and costs of equity.

A64. Based on the analysis discussed above and supported by my workpapers, I find a range of approximately 9.75% to 10.75% rounding the results to the nearest ¼ percent and eliminating the lowest and highest portion of the reasonable range. I also find that a hypothetical capital structure including 50% equity, which is similar to that of other water and wastewater utilities on a book value basis, is reasonable for ASU. I find that the best point estimate for the ROE is 10.25% but understand that AWU and ASU are applying for a lower ROE. As shown in Figure 21 above, if ASU was to use its actual 2019 year-end capital structure, the ROE needs to be substantially higher and for ASU to obtain the equivalent dollar amount it needs to be increased by more than 200 basis points.

For AWU, I recommend using its actual capital structure as of year-end 2019 along with a return on equity of 10.25%. I note that this recommendation is conservative as it is derived assuming an equity percentage of 50%, while AWU had only about 42% equity at year-end 2019.

I also note my recommendations are consistent with my empirical analysis using the DCF model and CAPM and also with the risk premium model. I also note that the primary methods relied upon such as the CAPM and DCF are similar to those used in Order 10 and result in a lower recommended ROE than would have been the case under the methodology used in Order 10.

Q65. Does this conclude your pre-filed direct testimony?

A65. Yes.