

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Application of California-American Water  
Company (U210W) for Authority to  
Establish its Authorized Cost of Capital for  
the Period from January 1, 2022 through  
December 31, 2024.

Application No. 21-05-

**CALIFORNIA-AMERICAN WATER COMPANY**

**DIRECT TESTIMONY OF BENTE VILLADSEN**

May 3, 2021

## TABLE OF CONTENTS

I.	Introduction and Qualifications .....	1
II.	Purpose and Summary of Conclusions .....	2
III.	Approach to Estimating the Cost of Capital .....	5
	A. Preliminary Comments .....	5
	B. Cost of Capital and Risk.....	7
	C. The Impact of Risk on the Cost of Capital .....	9
IV.	Capital Market conditions and the Cost of Capital.....	12
	A. Interest Rates .....	16
	B. Yield Spreads.....	18
	C. Risk Premiums.....	20
	D. Impact on ROE Estimation.....	26
V.	Analyzing the Cost of Equity .....	27
	A. Sample Selection .....	27
	B. Capital Structure .....	30
	C. The CAPM Based Cost of Equity Estimates .....	31
	D. Financial Risk and The Cost of Equity.....	37
	E. The DCF Based Estimates .....	40
	F. The Implied Risk Premium Model Estimates.....	45
VI.	California-American Water’s Specific Characteristics and the Cost of Equity.....	48
	A. Capital Expenditures, Capital Intensity and Operating Leverage .....	48
	B. Earning the Allowed ROE .....	52
	C. Unique Financial Circumstances – Asymmetric Risk.....	53
	D. Losing the Full Decoupling Mechanism (WRAM).....	54
VII.	Expected Cost of Debt .....	57
VIII.	Recommended Allowed ROE for California-American Water.....	59

## LIST OF EXHIBITS

Exhibit BV-1: Resume of Dr. Bente Villadsen

Exhibit BV-2: Technical Appendix

Exhibit BV-3: Cost of Equity Estimates

Exhibit BV-4: Expected Cost of Debt

Exhibit BV-5: Business Risk

Exhibit BV-6: Debt Equivalence

1 **I. INTRODUCTION AND QUALIFICATIONS**

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

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

5 **Q2. Briefly describe your educational and professional qualifications.**

6 A2. I have more than 20 years of experience working with regulated utilities on cost of capital  
7 and related matters. My practice focuses on cost of capital, regulatory finance, and  
8 accounting issues. I am the co-author of the text, “Risk and Return for Regulated Industries”<sup>1</sup>  
9 and a frequent speaker on regulatory finance at conferences and webinars. I have testified  
10 or filed expert reports on cost of capital in Alaska, Arizona, California, Hawaii, Illinois,  
11 Michigan, New Mexico, New York, Ohio, Oregon, and Washington, as well as before the  
12 Bonneville Power Administration, Federal Energy Regulatory Commission, the Surface  
13 Transportation Board, the Alberta Utilities Commission, the Ontario Energy Board, and the  
14 Barbados Fair Trading Commission. I have provided white papers on cost of capital to the  
15 British Columbia Utilities Commission, the Canadian Transportation Agency, Mexico’s  
16 Comisión Reguladora de Energía as well as to European and Australian regulators on cost of  
17 capital. I have testified or filed testimony on regulatory accounting issues before the Federal  
18 Energy Regulatory Commission (“FERC”), the California Public Utilities Commission  
19 (“Commission”), the Regulatory Commission of Alaska, the Michigan Public Service  
20 Commission, the Texas Public Utility Commission as well as in international and U.S.  
21 arbitrations and regularly provide advice to utilities on regulatory matters as well as risk  
22 management.

23 I hold a Ph.D. from Yale University and a BS/MS from University of Aarhus, Denmark.  
24 Prior to joining The Brattle Group, I was a business school faculty member at Washington  
25 University in St. Louis, University of Michigan, and University of Iowa. Appendix A

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<sup>1</sup> Bente Villadsen, Michael J. Vilbert, Dan Harris, A. Lawrence Kolbe, “Risk and Return for Regulated Industries,” Academic Press, 2017.

26 contains more information on my professional qualifications as well as a list of my prior  
27 testimonies and publications.

28 **II. PURPOSE AND SUMMARY OF CONCLUSIONS**

29 **Q3. What are the purpose and primary conclusions of your testimony?**

30 A3. The California-American Water Company (“California American Water” or “the  
31 Company”) has asked in the context of its request for a general update of its rates that I  
32 determine its cost of equity—i.e., the rate of return that capital markets would require for an  
33 equity investment in California-American Water. I find that an allowed return on equity  
34 (“ROE”) of 10.75 percent is reasonable, taking into account the characteristics of California-  
35 American Water and the competing opportunities for investment in equity markets.

36 **Q4. Would you please summarize the analysis and considerations that lead to these  
37 conclusions?**

38 A4. To determine the cost of capital for California-American Water, I selected, based on  
39 objective criteria, a sample of publicly-traded water utilities that are subject to rate regulation  
40 and calculated the cost of equity for the sample using standard models and methods such as  
41 the Capital Asset Pricing Models (“CAPM”), a version of the Empirical CAPM (“ECAPM”),  
42 the Discounted Cash Flow (“DCF”) models and a Risk Premium model. Applying each of  
43 these models to my proxy group companies, I derived the following ranges of reasonable  
44 ROE estimates for a generic water utility, which inform my recommendation.

<b>Reasonable ROE for Water Utilities</b>	
CAPM-Based Methods	9¾% –11%
DCF-Based Methods	10%
Implied Risk Premium	9.75%

45 It is important to note that while the overall ranges incorporate the results for the three  
46 estimation methods, and also include alternative inputs and formulations for the CAPM and  
47 DCF estimation methods, the ranges listed for each methodology does not take into account  
48 any unique features of California-American Water or California. However, in determining  
49 a reasonable range, I looked to the characteristics of financial markets and the industry such

50 as the presence of share buybacks and low dividend yields. This analysis indicates that the  
51 results from the DCF-Based models and the Implied Risk Premium model likely are  
52 downward biased. My analysis of California American Water’s business risk indicates that  
53 several are asymmetric in nature and therefore not captured in the estimated ROE and also  
54 indicates that a ROE towards the very top of the range is appropriate. Additionally, I note  
55 that California American Water has substantial assets that are not earning a weighted average  
56 cost of capital but instead are granted a debt return only. Further, for the purpose of  
57 estimating the return on equity, California American Water is facing higher leverage than  
58 what is included in its rate base in the form of a long-term (30-year) offtake contract for  
59 water in Monterey. Specifically, the presence of “imputed debt” from the contract means  
60 that the requested capital structure of 57.04 percent equity and 42.96 percent debt  
61 underestimates California American Water’s financial leverage. For that reason, I derive the  
62 estimated ROE using the capital structure that includes the debt-equivalence from the long-  
63 term contract associated with the Pure Water Monterey contract.

64 **Q5. Why do you emphasize the use of multiple estimation methods?**

65 A5. The consideration of multiple estimation methods is an essential practice when estimating  
66 the cost of equity capital. As my colleague, Professor Stewart C. Myers has eloquently  
67 advised:

68 Use more than one model when you can. Because estimating the  
69 opportunity cost of capital is difficult, only a fool throws away useful  
70 information.<sup>2</sup>

71 It is especially important to heed this advice amidst the current economic conditions, since  
72 the unprecedented impact of the COVID-19 pandemic has resulted in highly volatile  
73 financial markets, a sustained low interest rate environment and elevated risk aversion among  
74 investors. The Commission has in the past acknowledged the use of multiple methods.<sup>3</sup>

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<sup>2</sup> Stewart C. Myers, “On the Use of Modern Portfolio Theory in Public Utility Rate Cases: Comment,” *Financial Management*, Autumn 1978, p. 67.

<sup>3</sup> See, for example, Decision 18-030035, March 22, 2018, pp. 17-18 and CPUC Decision 09-05-019, issued May 8, 2009, p. 15.

75 Considering the relative merits of the multiple models and eliminating atypical outlying high  
76 and low-end results that are unduly influenced by unrepresentative data, I evaluate these  
77 results as indicating a reasonable return on equity for local water distribution utilities in the  
78 range of 9¾ to 10¾ percent. Due to the substantial risks of California-American Water from  
79 (i) its location in drought-plagued California, which, as explained in Company witness  
80 Jeffrey Linam’s direct testimony at Section IX.C, causes downward biased revenue recovery,  
81 (ii) unique assets that earn less than the weighted average cost of capital, and (iii) higher than  
82 average capital intensity, I recommend California American Water be allowed a return on  
83 equity at the upper end of the estimated range; i.e., 10¾ percent. I note that none of my  
84 results include an allowance for flotation costs.

85 In Section VI below, I discuss such California-American Water-specific risk and return  
86 considerations—including its accelerating capital expenditure requirements, the magnitude  
87 of deferrals which are not earning a standard return, the pending loss of the Water Revenue  
88 Adjustment Mechanism (“WRAM”), and the unusual circumstances facing California  
89 American Water in Monterey.

90 **Q6. Are you sponsoring any exhibits to your direct testimony?**

91 A6. Yes. I am sponsoring the following four exhibits, which I have attached to this testimony:

- 92 • Exhibit BV-1: Resume of Dr. Bente Villadsen
- 93 • Exhibit BV-2: Technical Appendix
- 94 • Exhibit BV-3: Cost of Equity Estimates
- 95 • Exhibit BV-4: Expected Cost of Debt
- 96 • Exhibit BV-5: Business Risk
- 97 • Exhibit BV-6: Debt Equivalence

98 **III. APPROACH TO ESTIMATING THE COST OF CAPITAL**

99 **A. PRELIMINARY COMMENTS**

100 **Q7. What are the guiding standards that define a just and reasonable allowed rate of return**  
101 **on rate-regulated utility investments?**

102 A7. The seminal guidance on this topic was provided by the U.S. Supreme Court in the *Hope* and  
103 *Bluefield* cases,<sup>4</sup> which found that:

- 104 1. The return to the equity owner should be commensurate with returns on investments  
105 in other enterprises having corresponding risks;<sup>5</sup>
- 106 2. The return should be reasonably sufficient to assure confidence in the financial  
107 soundness of the utility; and
- 108 3. The return should be adequate, under efficient and economical management for the  
109 utility to maintain and support its credit and enable it to raise the money necessary  
110 for the proper discharge of its public duties.<sup>6</sup>

111 **Q8. How have you conducted your cost of equity analysis?**

112 A8. As stated above, the standard for establishing a fair rate of return on equity requires that a  
113 regulated utility be allowed to earn a return equivalent to what an investor could expect to  
114 earn on an alternative investment of equivalent risk. Therefore, my approach to estimating  
115 the cost of equity for California American Water focuses on measuring the expected returns  
116 required by investors to invest in companies that face business and financial risks comparable  
117 to those faced by California American Water. Because the models I rely upon most heavily  
118 require market data, my consideration of comparable companies is restricted to those that  
119 have publicly traded stock.

120 To this end, I selected a sample of regulated water utilities that are comparable in business  
121 risk to California American Water. I consider both a Core Sample and an Expanded Sample,  
122 which is similar to the Core Sample but considers two smaller companies with limited data  
123 (Artesian and Global Water Resources). Having selected a group of comparable water  
124 utilities, I apply widely-accepted objective quantitative methodologies—specifically the

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

<sup>5</sup> Hope, 320 U.S. at 603.

<sup>6</sup> Bluefield, 262 U.S. at 680.

125 CAPM and DCF approaches—to estimate the return that investors require to provide capital  
126 for those utilities. As an indicator of the targeted returns of entities which will compete with  
127 California-American Water for investor capital, I have also analyzed the ROEs authorized  
128 for water utilities in U.S. regulatory jurisdictions in the form of an implied risk premium  
129 analysis. The CAPM, DCF, and Implied Risk Premium<sup>7</sup> approaches are all widely used in  
130 the utility and ratemaking setting including in recent filings before the Commission. I also  
131 reviewed business and financial risk factors pertaining to California-American Water and  
132 compare those to the characteristics of my sample companies.

133 The cost of equity for the CAPM and DCF based models are derived from market data that  
134 reflect the capital that investors hold in the sample companies. I consider the impact of any  
135 difference between the financial risk inherent in those cost of equity estimates and the capital  
136 structure used to determine California-American Water’s return. See Section V.D for a  
137 detailed discussion of the methods I use to account for differences in financial risk.

138 To arrive at my final ROE recommendation, I considered (i) the ranges of my cost of equity  
139 numbers, (ii) the current state of the economy and capital markets, (iii) the financial risk  
140 differences between California-American Water and the sample, and (iv) the business risks  
141 and specific financial circumstances of California-American Water relative to that of the  
142 sample. Based upon my analyses of these factors, I determined that a reasonable ROE for  
143 California-American Water should fall towards the upper end of the range for the sample.  
144 The average sample company with about 55 percent equity<sup>8</sup> appropriately has a cost of equity  
145 between 9¾ and 10¾ percent, so I believe an ROE of 10.75 percent is appropriate for  
146 California-American Water. That recommendation both falls within the reasonable range of

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<sup>7</sup> The Implied Risk Premium methodology relies on the evaluation of decades of market data by regulatory agencies and uses statistical techniques to assess how those allowed returns vary with respect to the level of risk-free interest rates. It is essentially a meta-analysis of existing regulatory review of years of market data. Importantly, my analysis employs all of the water utility rate case data tracked by SNL Financial, without filtering or excluding items from the database. I use the phrase “Implied Risk Premium” to distinguish this approach from the broader category of “risk premium” approaches, which can refer variously to asset pricing models such as the CAPM or to approaches that simply add a flat historical average risk premium (unadjusted for the impact of interest rates) to a current bond yield.

<sup>8</sup> I explain the use of the 55 percent equity in in detail in Section V.B below, but note that the debt equivalence of CAW’s long-term Clean Water Monterey contract adds approximately 2.5 percent debt to CAW’s capital structure.

147 returns for the more general class of local water distribution companies with comparable  
148 financial leverage and takes into account factors that influence where California-American  
149 Water’s return should fall within that range.

150 **Q9. How does the return on equity factor into the determination of an overall cost of capital**  
151 **for ratemaking purposes?**

152 A9. For ratemaking purposes, the allowed return on equity is a component in the determination  
153 of the overall return on the capital used to finance rate base. Importantly, the return on equity  
154 is multiplied by the equity balance in the regulatory capital structure to determine the equity  
155 portion of the total weighted average cost of capital (the regulatory “WACC”) of the utility  
156 which, in turn, is applied to the rate base.

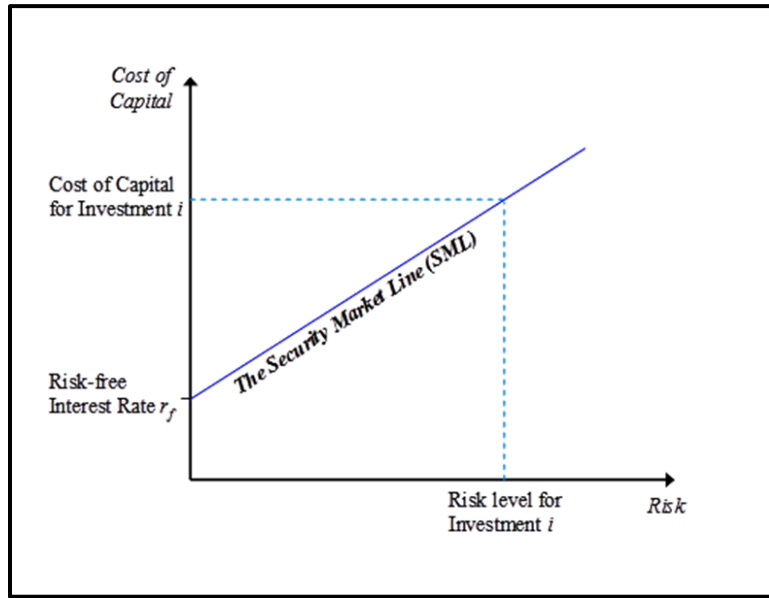
157 **B. COST OF CAPITAL AND RISK**

158 **Q10. How is the “cost of capital” defined?**

159 A10. The cost of capital is defined as the expected rate of return in capital markets on alternative  
160 investments of equivalent risk. The cost of capital is a type of opportunity cost: it represents  
161 the rate of return that investors could expect to earn elsewhere without bearing more risk.  
162 “Expected” is used in the statistical sense: the mean of the distribution of possible outcomes.  
163 The terms “expect” and “expected,” as in the definition of the cost of capital itself, refer to  
164 the probability-weighted average over all possible outcomes.

165 The definition of the cost of capital recognizes a tradeoff between risk and return that can be  
166 represented by the “security market risk-return line” or “Security Market Line” for short.  
167 This line is depicted in Figure 1 below. The higher the risk, the higher the cost of capital  
168 required.

**Figure 1: The Security Market Line**



169 **Q11. Why is the cost of capital relevant in rate regulation?**

170 A11. The “cost of capital” is the return that investors expect to earn on investments of comparable  
171 risk.<sup>9</sup> The fact that investors (in aggregate) require a certain return to compensate them for  
172 a given level of risk determines (via the operation of capital markets) the cost at which  
173 companies can raise capital. Consequently, the cost of capital is set forth in the *Hope* and  
174 *Bluefield* cases as a relevant factor for determining the return that a utility company should  
175 receive—and provide to its investors—on its invested capital.

176 **Q12. What does this mean from an economic perspective?**

177 A12. From an economic perspective, rate levels that give investors a fair opportunity to earn the  
178 cost of capital are the lowest levels that fully compensate investors for the risks they bear. A  
179 utility’s ability to attract capital and maintain its financial integrity requires that the combined  
180 equity return and equity ratio be such that not only is the expected return commensurate with  
181 that of other enterprises, but it also meets the expectations of credit market participants.

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<sup>9</sup> See Stewart C. Myers, “The Application of Finance Theory to Public Utility Rate Cases,” *The Bell Journal of Economics & Management Science*, 3:58–97 (1972).

182 More important for customers, however, are the broader economic consequences of  
183 providing an inadequate return to the company’s investors. In the short run, deviations from  
184 the expected rate of return on the rate base from the cost of capital may seemingly create a  
185 “zero-sum game”—investors gain if customers are overcharged, and customers gain if  
186 investors are shortchanged. In the longer term, inadequate returns are likely to cost  
187 customers—and society generally—far more than may be saved in the short run. Inadequate  
188 returns lead to inadequate investment, whether for maintenance or for new plant and  
189 equipment. Without access to investor capital, the company may be forced to forego  
190 opportunities to maintain, upgrade, and expand its systems and facilities in ways that  
191 decrease long run costs. Indeed, the cost to consumers of an undercapitalized industry can  
192 be far greater than any short-run gains from shortfalls in the cost of capital. This is especially  
193 true in capital-intensive industries (such as the water, electric and gas utility industries),  
194 which feature systems that decay over relatively long time horizons. Such long-lived  
195 infrastructure assets cannot be repaired or replaced overnight, because of the time necessary  
196 to plan and construct the facilities, and because of the difficulty of financing very large  
197 increases to rate base within a reasonable rate structure. Thus, it is in the customers’ interest  
198 not only to make sure the expected return of the investors does not exceed the cost of capital,  
199 but also that the expected return does not fall short of the cost of capital.

200 **C. THE IMPACT OF RISK ON THE COST OF CAPITAL**

201 **Q13. How, in summary, do you factor in risk when determining the cost of capital?**

202 A13. To ensure that the publicly traded sample companies for which I perform DCF and CAPM  
203 estimates have comparable business risk to California-American Water, I looked to traded  
204 entities whose business is primarily focused on regulated water utility operations. I  
205 structured my analysis to account for differences in financial leverage among the sample  
206 utilities, and for differences in the levels of financial risk imposed by the market value capital  
207 structures of the sample companies and the regulatory capital structure used to set California-  
208 American Water’s revenue requirement. To determine where in the reasonable range of cost  
209 of equity estimates California-American Water’s allowed ROE should be situated, I  
210 compared the business risk of California-American Water to that of the sample utilities.

211 **Q14. Why is capital structure important for the determination of the cost of equity?**

212 A14. The equity holders in a company with higher levels of debt face more financial risk to their  
213 equity investment and therefore require a higher return on equity than would equity holders  
214 in an otherwise identical company with lower levels of debt financing.<sup>10</sup> This is because  
215 debt holders are paid prior to equity holders, who as the owners of the firm have only the  
216 residual claim of its assets. Practically, in dissolution, everyone else eats their fill before  
217 equity holders come to the table. Even without financial distress, equity holders receive what  
218 is left—which may be either a profit or a loss—after fixed payments are made to satisfy debt  
219 holders. Consequently, increased debt financing increases equity risk (in the form of  
220 amplified variability of returns) associated with the residual claim.

221 There are several ways in which the impact of financial risk can be taken into account in an  
222 analysis of cost of equity. One way is to determine the overall (after-tax) weighted-average  
223 cost of capital for the sample using the equity and debt percentages as the weight assigned to  
224 the cost of equity and debt. This overall cost of capital primarily depends on the business  
225 risk of the sample companies, having been adjusted on an apples-to-apples basis for  
226 differences in (market value) leverage among the companies. If the overall cost of capital is  
227 constant between the estimate obtained for the sample and the entity to which it is applied in  
228 this case—the capital structure used to set the company’s allowed return on rate base—then  
229 the allowed ROE that appropriately reflects the financial risk of the regulated entity can be  
230 determined. This approach assumes that the after-tax weighted-average cost of capital is  
231 constant for a range that spans the capital structures used to estimate the cost of equity and  
232 the regulatory capital structure.<sup>11</sup>

233 Another common textbook approach was developed by Professor Hamada, who estimated  
234 the cost of equity using the CAPM and made comparisons between companies with different  
235 capital structures via “unlevering” and “relevering” adjustments to the market beta.  
236 Specifically, in the Hamada approach, I use the estimated beta to calculate what beta would

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<sup>10</sup> Robert S. Hamada, “Portfolio Analysis, Market Equilibrium and Corporate Finance,” *The Journal of Finance*, 24: 13–31 (March 1969).

<sup>11</sup> See also the discussion in Jonathan Berk & Peter DeMarzo, *Corporate Finance*, 3rd Edition, 2014, p. 490.

237 be associated with a 100 percent equity financed firm. This is the so-called “all-equity”,  
238 “unlevered”, or “assets” beta, which can then be re-levered to determine the equity beta  
239 associated with the regulatory capital structure. In Section V.D and the technical appendix  
240 to this testimony (Ex. BV-2), I provide additional explanation of the methods used to account  
241 for financial risk when estimating the cost of capital.

242 **Q15. What capital structure do you use in your cost of capital analyses?**

243 A15. I recommend that the Commission use California-American Water’s 2022 test year capital  
244 structure. The forward-looking capital structure is consistent with the notion that the cost of  
245 capital is forward-looking and with the fact that rates will go into effect in 2022. To further  
246 ensure consistency, I rely on a risk-free rate that is applicable to 2022-24, which is the period  
247 over which rates are expected to be in effect. The test year capital structure of California-  
248 American Water includes 57.04 percent equity / 42.94 percent debt.<sup>12</sup> I find the use of a  
249 2022 test year capital structure reasonable as this period coincides with the time that rates  
250 will go into effect. My cost of equity estimate uses forward-looking inputs so that all cost  
251 of capital parameters is estimated for a consistent time period.

252 It is a common first step to rely on a sample of comparable companies to estimate the cost  
253 of equity for companies with comparable business risks, and the use of a sample is absolutely  
254 required, where the subject utility itself issues no equity for which there is a publicly traded  
255 market. However, this is only the first step in determining the cost of equity for a specific  
256 company, because any one company may face larger business, financial, or regulatory risks  
257 than the sample. Step two is an assessment of the risk associated with the target entity—  
258 California-American Water in this case. Therefore, if California-American Water’s rate base  
259 is financed at a lower equity percentage than the sample companies, an adjustment needs to  
260 be made for the added risk in California-American Water’s capital structure.

261 It is important to keep in mind that the portion of the total dollar return on rate base  
262 attributable to equity investment is calculated as the allowed ROE multiplied by the equity

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<sup>12</sup> See the Direct Testimony of Jeffrey Linam at Section IV. I note that the debt equivalent of California American Water’s long-term water supply contract adds more than 2 percent debt to the financial leverage.

263 component of rate base. So as illustrated below, the cost to customers would be the same if  
 264 the capital structure includes 60 percent equity with a ROE of 10 percent or if a capital  
 265 structure includes 50 percent equity with an ROE of 12 percent.

**Figure 2: Example Illustrating Customer Cost Associated with Equity Returns**

		Scenario A	Scenario B
Equity Percentage	[a]	60.0%	50.0%
Rate Base	[b]	\$1,000	\$1,000
Allowed ROE	[c]	10.0%	12.0%
Cost to Customers	[d] = [a] x [b] x [c]	\$60	\$60

266 **IV. CAPITAL MARKET CONDITIONS AND THE COST OF CAPITAL**

267 **Q16. What do you cover in this section?**

268 A16. In this section, I address recent changes in capital market conditions, including the impact of  
 269 COVID-19 on volatility equity and debt markets, unique factors for the utility industry and  
 270 how these factors affect the cost of equity and its estimation. Specifically, I address (i)  
 271 interest rate developments; (ii) investors perception of the market risk premium; and (iii) the  
 272 developments in systematic or non-diversifiable risk as measured by beta. I also address  
 273 briefly California-specific economic or financial market risks.

274 **Q17. Why do you discuss capital market conditions in a testimony aimed at determining**  
 275 **California American Water ROE?**

276 A17. Capital market conditions are important to cost of equity estimation methodologies and can  
 277 affect the inputs to the cost of equity models. Inputs to the DCF model are affected by the  
 278 economy in general, as economic growth will affect growth rates and utility stock prices.  
 279 Consequently, capital market developments affect the growth rates, dividend yields, and the  
 280 assessment of estimates' reasonableness.

281 Furthermore, the risk-free rate is an input to the risk premium and CAPM. Therefore, recent  
 282 and expected developments in government bond yields are important to assess the validity  
 283 of any measure of the risk-free rate. Similarly, the Market Risk Premium (“MRP”) is an input

284 to the CAPM, so factors that affect the MRP (e.g., volatility and changes in investors' risk  
285 perceptions) are vital for accurate determination of the ROE.

286 **Q18. Can you provide a summary of recent events that have impacted capital market**  
287 **conditions?**

288 A18. Over the past year, capital markets experienced unprecedented levels of uncertainty due to  
289 the impacts of the COVID-19 pandemic on the global economy. Following the formal  
290 pandemic declaration by the World Health Organization in March 2020, governments around  
291 the world sought to limit the health and economic impacts from the outbreak. States issued  
292 stay-at-home orders and major portions of the U.S. economy shut down. This also led to a  
293 significant rise in unemployment with over 77 million people filing initial unemployment  
294 claims since March 21, 2020.<sup>13</sup> In California alone, employment was down by almost a  
295 million from December 2019 to December 2020.<sup>14</sup>

296 To mitigate the economic impact, the U.S. Federal Reserve cut its policy rate to 0 to 0.25  
297 percent and announced “unlimited” quantitative easing and emergency liquidity programs.<sup>15</sup>  
298 The U.S. also passed the \$2.1 trillion CARES Act, which provided direct aid to people and  
299 businesses and also bolstered unemployment benefits. Despite these efforts, the U.S.  
300 economy contracted substantially and by June 2020 the U.S. entered a recession.<sup>16</sup> In the 1<sup>st</sup>  
301 and 2<sup>nd</sup> Quarter, real GDP decreased by an annualized rate of 5.0% and 31.4%, respectively.<sup>17</sup>

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<sup>13</sup> U.S. Department of Labor, Unemployment Insurance Weekly Claims Data, accessed March 2, 2021, <https://oui.doleta.gov/unemploy/claims.asp>.

<sup>14</sup> [California unemployment increased 0.9% since November 2020 | California EDD](#)

<sup>15</sup> U.S. Federal Reserve, “Federal Reserve Announces Extensive New Measures to Support the Economy,” Press Release, March 23, 2020.

<sup>16</sup> National Bureau of Economic Research, “Determination of the February 2020 Peak in US Economic Activity,” June 8, 2020, accessed September 21, 2020, <https://www.nber.org/cycles/june2020.html>.

<sup>17</sup> Bureau of Economic Analysis, “Gross Domestic Product, 2nd Quarter 2020 (Third Estimate); Corporate Profits, (Revised)”, U.S. Department of Commerce, September 30, 2020. Accessed October 2, 2020, <https://www.bea.gov/news/2020/gross-domestic-product-third-estimate-corporate-profits-revised-and-gdp-industry-annual>.

302 More recently, the U.S. government has passed a \$1.7 trillion American Rescue Plan, which  
303 similarly is intended to stimulate the U.S. economy.<sup>18</sup>

304 However, economic conditions improved in the second half of 2020 as the economy began  
305 to reopen, albeit many businesses operated at reduced capacity to comply with social  
306 distancing and other guidelines. In the 3<sup>rd</sup> and 4<sup>th</sup> Quarter, real GDP increased by an  
307 annualized rate of 33.4% and 4.1%, respectively.<sup>19</sup> Despite the rebound, real GDP declined  
308 by 3.5% in 2020.<sup>20</sup> The Federal Reserve also remains cautious about the pace and extent of  
309 the recovery. In December 2020, the Federal Reserve reiterated “Economic activity and  
310 employment have continued to recover but remain well below their levels at the beginning  
311 of the year,” and “the ongoing public health crisis will continue to weigh on economic  
312 activity, employment, and inflation in the near term, and poses considerable risk to the  
313 economic outlook over the medium term.”<sup>21</sup> The Federal Reserve has kept its policy interest  
314 rate at 0 to 0.25 percent and is also continues to support financial markets through its  
315 expanded quantitative easing programs.<sup>22</sup>

316 While the length and extent of the economic impacts from the COVID-19 pandemic are  
317 unknown, the impacts are expected to persist for some time.

318 **Q19. What are the expectations going forward?**

319 A19. The impacts on the economy and unemployment will depend on how long the economy  
320 remains partially shut down, but the economy is expected to continue to recover in mid-2021  
321 based on recent forecasts. Recent survey by economist, such as the *Blue Chip Economic*  
322 *Indicators* (“BCEI”) survey, indicate that U.S. real GDP will increase by 5.7% in 2021 and

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<sup>18</sup> See, for example, [Senate passes Biden's \\$1.9 trillion relief package including \\$1,400 stimulus checks \(yahoo.com\)](https://www.yahoo.com/news/senate-passes-biden-s-1-9-trillion-relief-package-including-1-400-stimulus-checks-1200000000.html)

<sup>19</sup> Bureau of Economic Analysis, “Gross Domestic Product, Fourth Quarter and Year 2020 (Second Estimate)”, U.S. Department of Commerce, February 25, 2021. Accessed March 2, 2021, <https://www.bea.gov/news/2021/gross-domestic-product-fourth-quarter-and-year-2020-second-estimate>

<sup>20</sup> Ibid.

<sup>21</sup> Board of Governors of the Federal Reserve System, “Federal Reserve issues FOMC statement,” December 16, 2020, <https://www.federalreserve.gov/newsevents/pressreleases/monetary20201216a.htm>.

<sup>22</sup> Ibid.

323 4.1% in 2022 for a nominal GDP at about 8 and 6 percent, respectively.<sup>23</sup> In August, the U.S.  
324 Federal Reserve announced a policy change whereby they would target inflation of 2% on  
325 average, noting that the Federal Reserve would hold overnight borrowing interest rates lower  
326 for longer.<sup>24</sup> Recent projections from the FOMC clarified that policy rates will remain at  
327 current levels through at least 2023.<sup>25</sup> This will likely continue to exert downward pressure  
328 on interest rates over the near to medium term.

329 **Q20. How does this impact the cost of equity estimation for California American Water?**

330 A20. It is important to remember that the cost of equity and capital structure established for  
331 California American Water in this proceeding is expected to be in effect beyond the current  
332 extraordinary impacts of the COVID-19 pandemic. Specifically, the authorized ROE and  
333 capital structure that is determined in this proceeding is expected to be in effect for 2022,  
334 2023, and 2024. Consequently, the analysis and recommendations should reflect expected  
335 market conditions that will prevail over the relevant rate period and not exclusively current  
336 market conditions. As discussed further below, many of the inputs to the cost of equity  
337 estimation methodologies are currently at unprecedented levels. Sole reliance on current  
338 economic and financial conditions to estimate California American Water's cost of equity  
339 would unfairly lock California American Water and their customers into the current  
340 economic and financial environment. Doing so would also not provide a fair return,  
341 especially when compared to other utilities that did not undergo a cost of capital proceeding  
342 during this period. However, the current conditions create an exorbitant amount of  
343 uncertainty about the future and, if the financial crisis can be used as a guide, investors'  
344 heightened perceptions of risk are likely to linger.

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<sup>23</sup> Wolters Kluwer Blue Chip Economic Indicators, March 2021, p. 2-3

<sup>24</sup> 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 March 2, 2021, <https://www.federalreserve.gov/newsevents/pressreleases/monetary20200827a.htm>.

<sup>25</sup> U.S. Federal Reserve, "March 17, 2021: FOMC Projections materials, accessible version," March 17, 2020, <https://www.federalreserve.gov/monetarypolicy/fomcproptabl20210317.htm>.

345           **A. INTEREST RATES**

346   **Q21. How do interest rates affect the cost of equity?**

347   A21. The current interest rate environment affects the cost of equity estimation in several ways.  
348       Most directly, the CAPM takes as one of its inputs a measure of the risk-free rate (see Figure  
349       1). The estimated cost of equity using the CAPM decreases (increases) by one percentage  
350       point when the risk-free rate decreases (increases) by one percentage point, all else equal.  
351       Therefore, to the extent that prevailing government yields are depressed due to economic  
352       uncertainties related to COVID-19 or the monetary policy responses, using current yields as  
353       the risk-free rate will depress the CAPM estimate below what is representative of the  
354       forward-looking cost of equity, which will be in effect during the relevant regulatory period.  
355       Put differently, with current government bond yields downwardly biased due to flight-to-  
356       quality behavior by investors and “unlimited” quantitative easing programs by the U.S.  
357       Federal Reserve, using current yields in the CAPM will also downward bias the cost of equity  
358       estimate. At the same time, a low interest rate is associated with a high market risk premium,  
359       so that these two measures offset one another to a degree. To avoid any bias in the cost of  
360       equity estimate, it is important to use a forecasted risk-free rate and consider whether the rate  
361       needs to be normalized (or the risk premium investors require needs to be adjusted) to ensure  
362       the resulting CAPM estimate reflects a non-biased estimate of California American Water’s  
363       cost of equity over the relevant regulatory period. As the economy begins to recover, as  
364       forecasted, interest rates are expected to increase from current levels.<sup>26</sup> Therefore, the  
365       allowed fair return on equity for California American Water should reflect the future interest  
366       rate environment.

367   **Q22. What are the relevant developments regarding interest rates?**

368   A22. Current interest rates remain low at 1.73%,<sup>27</sup> despite significant improvement since the  
369       historic low levels in 2020. In contrast, the yield on 10-year U.S. Government bonds was 2.3

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<sup>26</sup> The 10-year Treasury bond yield has increased more than 50 basis points from the summer of 2020; for example, the yield was 0.55% on August 6, 2020 but stood at 1.73% on April 5, 2021.

<sup>27</sup> Federal Reserve, FRED, as of April 5, 2021.

370 percent in April 2017, when the last cost of capital proceeding for California water utilities  
371 was filed.<sup>28</sup> As large parts of the economy began to shut down in response to the pandemic,  
372 investors fled riskier assets for safer assets. This demand for U.S. government bonds caused  
373 bond yields to decrease rapidly. On March 9, 2020, the entire U.S. yield curve fell below 100  
374 bps for the first time in history and the 10-year U.S. government bond yield hit a record low  
375 of 0.339%.<sup>29</sup> Since then, long-term government bond yields have increased somewhat. Later  
376 that month, the Federal Reserve lowered the federal funds target rate to the 0 to 0.25 percent  
377 range and announced “unlimited” quantitative easing to support the financial markets.<sup>30</sup>  
378 Since then, the U.S. government bond yields have risen—particularly in light of vaccine  
379 distribution—but still remain near historic lows.

380 Looking forward, treasury bonds are forecasted to increase, which is depicted in Figure 3  
381 below. Blue Chip Economic Indicators’ (“BCEI”) March 2021 edition forecasts that the  
382 yield on 10-year treasury bonds will increase. Specifically, BCEI projects the 10-year  
383 government bond yield will be 1.9, 2.3 and 2.5 percent in 2022, 2023 and 2024, respectively  
384 (Figure 3).<sup>31</sup> The expectations for the period 2022-2024 is what is relevant for this  
385 proceeding. Because the risk-free rate is an input to several cost of equity estimation models,  
386 the relationship between current and forecasted risk-free rates is an important consideration.

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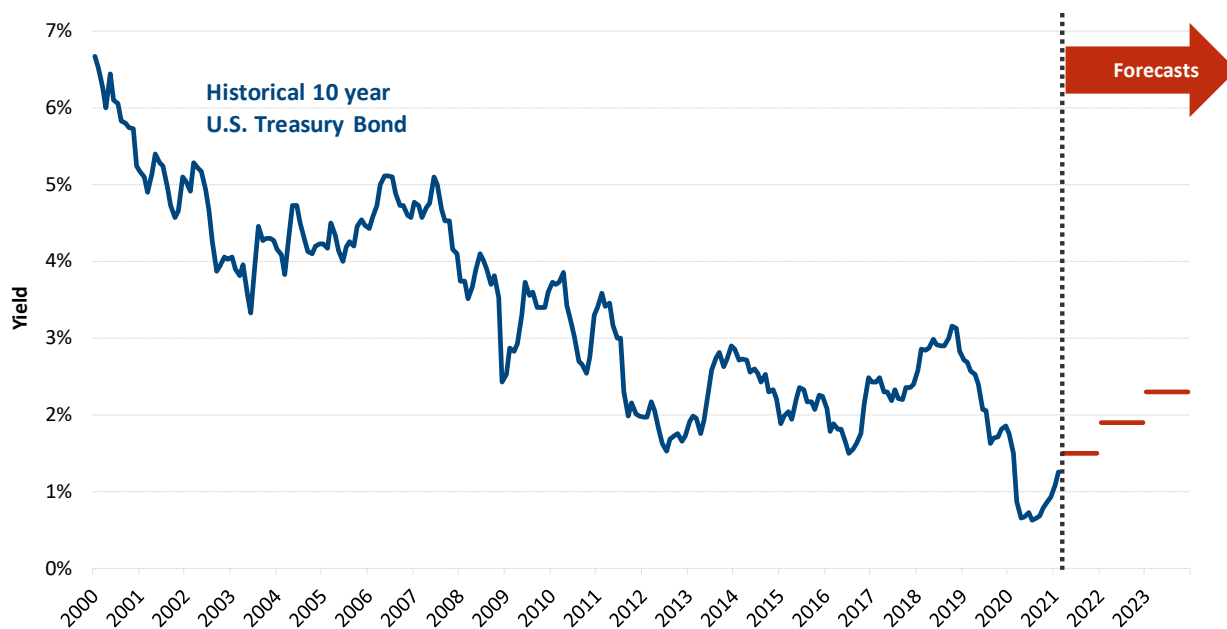
<sup>28</sup> Ibid.

<sup>29</sup> 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>

<sup>30</sup> U.S. Federal Reserve, “Federal Reserve Announces Extensive New Measures to Support the Economy,” Press Release, March 23, 2020.

<sup>31</sup> Wolters Kluwer Blue Chip Economic Indicators, March 2021, p. 14.

**Figure 3: Historical and Projected Ten-Year Treasury Bond Yields<sup>32</sup>**



Source: Historical data from Bloomberg. Forecasts from Blue Chip Economic Indicators March 2021.

387 **B. YIELD SPREADS**

388 **Q23. Why are bond yield spreads relevant to your cost of equity analysis?**

389 A23. Bond yield spreads (also called credit spreads) reflect the premium that investors demand to  
390 hold debt securities (specifically corporate or utility bonds) that are not risk free.  
391 Analogously, the MRP, which is a key input to the CAPM cost of equity estimation,  
392 represents the risk premium that investors require to hold equities rather than risk-free  
393 government bonds.

394 If bond yields are influenced to some extent by the same underlying market factors that drive  
395 the systematic risk premium for equities, then shifts in directly observable credit spreads can  
396 assist with inference about changes in the MRP, which itself must be estimated.<sup>33</sup> More  
397 specifically, if both credit spreads and equity premiums are determined in part by the general

<sup>32</sup> Id.

<sup>33</sup> 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.

398 premium required by investors for bearing systematic risk, then an increase in credit spreads  
399 may indicate an increase in the forward-looking MRP.

400 **Q24. How does the current spread between utility and U.S. government bond yields compare**  
401 **to historical spreads?**

402 A24. Utility bond yield spreads increased substantially in 2020, (but have since declined). As  
403 shown in Exhibit BV-2, the spread between 20-year A-rated utility bond yields and 20-year  
404 U.S. government bond yields are currently at 1.06%, while the average prior to the financial  
405 crisis was approximately 0.93%. Thus, the yield spread is modestly elevated. In the most  
406 recent cost of capital proceeding, A17-04-003, I used a scenario with and adjustment for  
407 elevated yield spread, here I conservatively do not adjust the risk-free rate as the elevation  
408 in yield spread is low compared to that of the recent past as well as that at the time of A17-  
409 04-003.

410 Of importance, S&P Global Ratings downgraded the outlook for North American utilities  
411 from “stable” to “negative” due to COVID-19 risks in April 2020, citing concerns about the  
412 adequacy of utilities’ financial cushions to weather the financial downturn.<sup>34</sup> As of January  
413 25, 2025 S&P Global Ratings maintain the negative outlook on utilities noting that the  
414 “[c]redit quality for the North American regulated utility industry weakened in 2020” and  
415 that “[d]espite our negative 2021 industry outlook, [S&P] expect a modest improvement to  
416 credit quality over the next 12 months.”<sup>35</sup> With heightened concern about utility credit,  
417 spreads and risk premiums merit careful monitoring and plausibly will impact not only  
418 California American Water’s cost of equity, but also their cost of debt. I discuss the cost of  
419 debt in Section VII below.

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<sup>34</sup> *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>

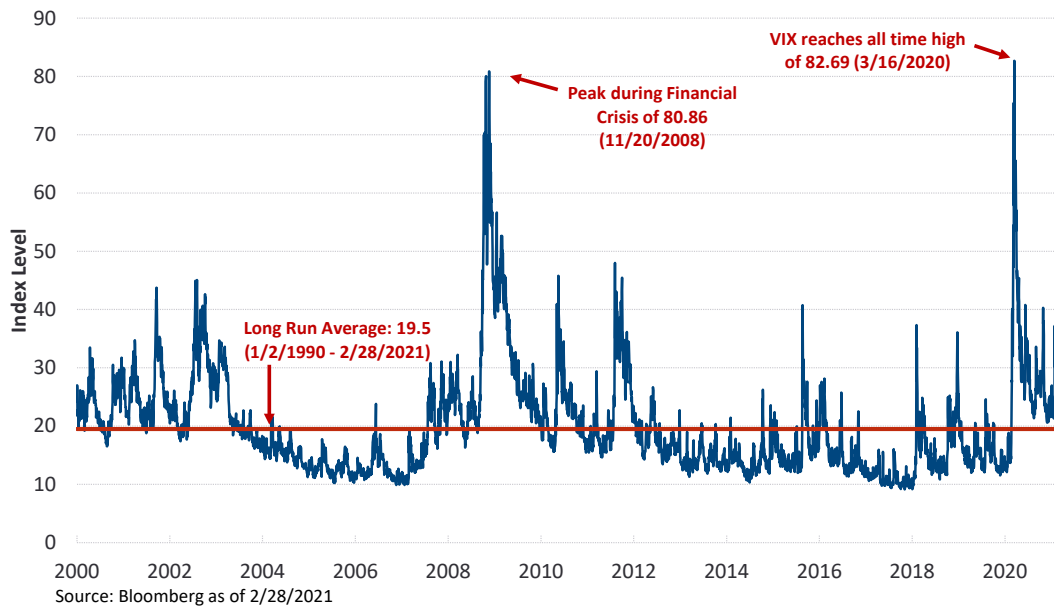
<sup>35</sup> S&P Global Ratings, “North American Regulated Utilities: Negative Outlook Could See Modest Improvement,” January 20, 2021. I am not aware of a more recent update to this commentary.

420 C. RISK PREMIUMS

421 Q25. What is the current evidence regarding market volatility?

422 A25. During the early months of COVID-19, financial markets became extremely volatile as  
423 shown in near-term common volatility measures, such as the VIX, which is frequently  
424 referred to as the market’s fear index. The VIX reached an all-time high of 82.69 on March  
425 16, 2020, which was higher than the peak of 80.86 during the Financial Crisis. However,  
426 the VIX has recently retreated to its long-term average or slightly below at between 16.6 and  
427 30 in February and March 2021 with the highest level seen at the beginning of the month on  
428 February 1, 2021.<sup>36</sup> Of note, as recently as January 27, 2021, the VIX stood at 37 illustrating  
429 the high degree of variability in the measure.

Figure 4: VIX



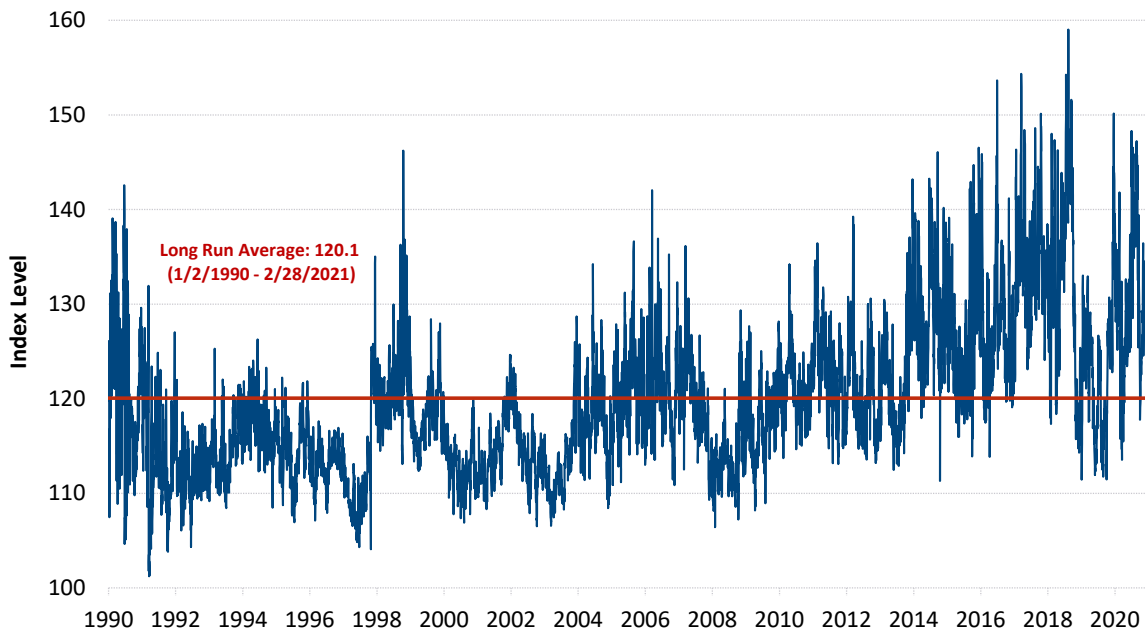
430 Similarly, the SKEW index, which measures the market’s willingness to pay for protection  
431 against negative “black swan” stock market events (i.e., sudden substantial downturns),<sup>37</sup>  
432 shows that investors are cautious. A SKEW value of 100 indicates outlier returns are

<sup>36</sup> Bloomberg, as of February 28, 2021 and CBOE as of January 27, 2021; <https://www.google.com/search?q=VIX+cboe&sourceid=ie7&rls=com.microsoft:en-US:IE-Address&ie=&oe=#spf=1611799158418>

<sup>37</sup> For example, <http://www.cboe.com/products/vix-index-volatility/volatility-indicators/skew>.

433 unlikely, but as the SKEW increases, the probability of outlier returns becomes more  
434 significant. Figure 5 below shows the development in the SKEW since 2005 and that the  
435 index has recently increased following a period of declining SKEW. The index spiked over  
436 148.3 on June 30, 2020 and stood at 136.2 on February 26, 2021, which is well above its  
437 long run average of 120.1. The recent spike in the SKEW shows that investors continue to  
438 pay for protection against downside risks.

**Figure 5: SKEW**



Source: Bloomberg as of 2/28/2021

439  
440 The variability in VIX and SKEW shows that investors are cautiously optimistic about  
441 investing in equity.

442 **Q26. What is the Market Risk Premium?**

443 A26. In general, a risk premium is the amount of “excess” return—above the risk-free rate of  
444 return—that investors require to compensate them for taking on risk. As illustrated in Figure  
445 1 the riskier the investment, the larger the risk premium investors will require.

446 The MRP is the risk premium associated with investing in the market as a whole. Since the  
447 so-called “market portfolio” embodies the maximum possible degree of diversification for

448 investors,<sup>38</sup> the MRP is a highly relevant benchmark indicating the level of risk compensation  
449 demanded by capital market participants. It is also a direct input necessary to estimating the  
450 cost of equity using the CAPM and other risk-positioning models.

451 **Q27. Please explain the current evidence related to the MRP.**

452 A27. The heightened volatility has increased the premium that investors require to hold risky  
453 assets, especially when measured utilizing forward-looking methodologies that estimate  
454 expected market returns with reference to current dividend yields. Bloomberg’s forward-  
455 looking estimate of the MRP for the U.S. increased to as high as 9.84 percent in March 2020  
456 and remained high at 8.03 percent—albeit lower compared to March 2020 levels— as of  
457 February 28, 2021.<sup>39</sup>

458 **Figure 6: Bloomberg’s Daily Market Risk Premium and Risk Free Rate**  
459 **(Jan. 2020 – Feb. 2021).**



<sup>38</sup> In finance theory, the “market portfolio” describes a value-weighted combination of all risky investment assets (e.g., stocks, bonds, real estate) that can be purchased in markets. In practice, academics and financial analysts nearly always use a broad-based stock market index, such as the S&P 500, to represent the overall market.

<sup>39</sup> Bloomberg, as of February 28, 2021. Measured over a 10-year U.S. Treasury bond.

460 **Q28. Are higher risk premiums relevant given that treasuries are near historic lows?**

461 A28. Yes—this is highly relevant for cost of equity estimation as current risk-free rates are  
462 extremely low. On March 9, 2020, the entire U.S. yield curve settled below 1.00% for the  
463 first time in history.<sup>40</sup> Since then, U.S. Government bond yields have increased with the 20-  
464 year and 30-year bond yields above 2.00%. The decrease in bond yields had occurred as  
465 investors fled to safer assets due to the heightened market uncertainty.

466 As shown above in Figure 6, the MRP has also increased as the risk-free rate declined.  
467 Further, as shown in both academic and industry analyses, the allowed risk premium over  
468 the risk-free rate is inversely related to the risk-free rate. For example, Villadsen et al. (2017)  
469 found that the allowed risk premium increases by approximately 0.44% for each 1% decline  
470 in the risk-free rate for the period 1990 to 2015.<sup>41</sup> Morin finds that the risk premium increases  
471 by 0.52% for each 1% decline in the risk-free rate.<sup>42</sup> Importantly, statistical analyses of the  
472 relationship between the allowed ROE and the risk-free rate in the electric and gas utilities  
473 industry show that since 2011, a one percent decline in the risk-free rate leads to a decline in  
474 the ROE of much less than what was the case previously.<sup>43</sup> As shown in Figure 6 above, this  
475 phenomenon is also documented in the forward-looking market risk premium calculated by  
476 Bloomberg. According to Bloomberg, the MRP is 8.03% over the 10-year Treasury bond for  
477 a MRP of about 7.53% over the 20-year Treasury bond.<sup>44</sup> Thus, the forward-looking MRP is

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<sup>40</sup> 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. Source: <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>

<sup>41</sup> Bente Villadsen, Michael J. Vilbert, Dan Harris, and A. Lawrence Kolbe, “*Risk and Return for Regulated Industries*,” Academic Press, 2017, pp. 118-119.

<sup>42</sup> Roger A. Morin, “*New Regulatory Finance*,” Public Utilities Reports, Inc., 2006, pp. 123-125.

<sup>43</sup> For details, see Villadsen Direct Testimony in Illinois Commerce Commission Docket D-21-0098 (Nicor Gas Ex. 14.0), pp. 58-60. I note that I cannot readily undertake the same analysis for water utilities as I lack sufficient data.

<sup>44</sup> Bloomberg, as of February 28, 2021. The 7.53% MRP is relative to the contemporaneous yield over a 20-Yr treasury bond. Relative to the contemporaneous yield over a 10-Yr treasury bond, the Bloomberg reported MRP is 8.03%.

478 higher than the historical average MRP of about 7.25 percent. It is also an increase over the  
479 forward-looking MRPs at the end of 2017 of approximately 6.6%.<sup>45</sup>

480 **Q29. Is there evidence that the MRP will remain elevated for a period of time going forward?**

481 A29. Yes. In 2015, Duarte and Rose of the Federal Reserve of New York performed a study that  
482 aggregated the results of many models of the required MRP in the United States and tracked  
483 them over time.<sup>46</sup> This analysis found a very high MRP after the financial crisis, relative to  
484 time periods prior the crisis.

485 The authors estimated the MRP that resulted from a range of models each year from 1960  
486 through the time of their study. The authors then reported the average as well as the first  
487 principal component of the results.<sup>47</sup> The authors found that the models used to determine  
488 the risk premium were converging to provide comparable estimates and that the average  
489 annual estimate of the MRP had reached an all-time high in 2012-2013. (Figure 7 below is a  
490 copy of the summary chart from Duarte and Rosa’s 2015 paper). These directional trends  
491 identified by Duarte and Rosa are reasonably consistent with those observed from Bloomberg  
492 and they further support the proposition that the elevation of the MRP over its historical pre-  
493 crisis levels was a persistent feature of capital markets in the time following the financial  
494 crisis. Specifically, the financial crisis saw high volatility and a flight to quality – similar to  
495 conditions seen in 2020 in response to the COVID-19 pandemic and the period during which  
496 the authors found a high MRP broadly coincide with the period of low interest rates.  
497 Therefore, it is reasonable to expect that the current MRP will remain elevated compared to  
498 historical levels, especially given the uncertainty related to the extent of economic and  
499 financial impacts from COVID-19 and the historically low interest rates.

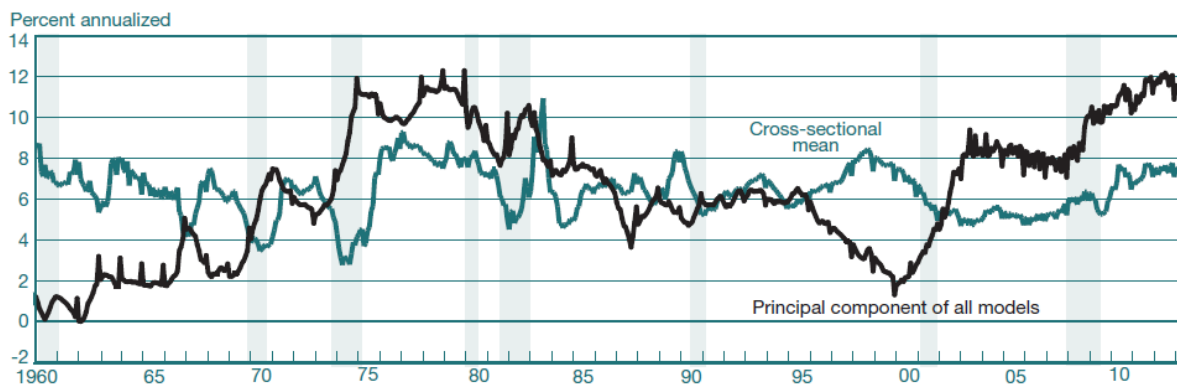
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<sup>45</sup> My Direct Testimony in Application A17-04-003 found a Bloomberg MRP of 7.1% over the 10-year government bond for a MRP of about 6.6% over the 20-year government bond.

<sup>46</sup> Fernando Durate 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](https://www.newyorkfed.org/research/staff_reports/sr714.html).

<sup>47</sup> 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.

**Figure 7: Duarte and Rosa's Chart 3  
One-Year Ahead MRP and Cross-Sectional Mean of Models**



500

501 **Q30. Please summarize how the economic developments discussed above have affected the**  
 502 **return on equity and debt that investors require.**

503 A30. Utilities rely on investors in capital markets to provide funding to support their capital  
 504 expenditure programs and efficient business operations. Investors consider the risk-return  
 505 tradeoff in choosing how to allocate their capital among different investment opportunities.  
 506 It is therefore important to consider how investors view the current economic conditions,  
 507 including the plausible developments in the risk-free rate and the growth in the U.S. GDP.

508 These investors have been affected by the recent market volatility, so there are reasons to  
 509 believe that their risk aversion remains elevated relative to pre-COVID-19 levels. As  
 510 California American Water is expected to be compensated as a utility on the equity  
 511 component of its rate base, the same factors would affect California American Water's  
 512 equity.

513 **Q31. How does this impact the cost of equity estimation for California American Water?**

514 A31. It is important to remember that the cost of equity and capital structure established for  
 515 California American Water in this proceeding is expected to be in effect beyond the current  
 516 extraordinary impacts of the COVID-19 pandemic. The analysis and recommendations  
 517 should reflect expected market conditions that will prevail over the relevant rate period and  
 518 not exclusively the current market conditions. As discussed further below, many of the inputs  
 519 to the cost of equity estimation methodologies are currently at unprecedented levels. Sole

520 reliance on current economic and financial conditions to estimate California American  
521 Water's cost of equity would unfairly lock California American Water and their customers  
522 into the current economic and financial environment. Doing so would also not provide a fair  
523 return, especially when compared to other utilities that did not undergo a cost of capital  
524 proceeding during this period. However, the current conditions create an exorbitant amount  
525 of uncertainty about the future and, if the financial crisis can be used as a guide, investors'  
526 heightened perception of risk are likely to linger.

527 **D. IMPACT ON ROE ESTIMATION**

528 **Q32. Please summarize how the economic developments discussed above have affected the**  
529 **ROE and debt that investors require?**

530 A32. Utilities rely on investors in capital markets to provide funding to support their capital  
531 expenditure program and efficient business operations, and investors consider the risk return  
532 tradeoff in choosing how to allocate their capital among different investment opportunities.  
533 It is therefore important to consider how investors view the current economic conditions,  
534 including the plausible development in the risk-free rate and the current Market Risk  
535 Premium.

536 These investors have been dramatically affected by the COVID-19 pandemic and the  
537 resulting market volatility. Similarly, the effects of the Federal Reserve's monetary policy  
538 have artificially lowered the risk-free rate. As a result, government bond yields are at  
539 historical lows, while the forecasted MRP are above the historical average. Thus, the  
540 premium investors require to hold securities that are not risk-free has increased.

541 **Q33. Does your analysis consider the current economic conditions?**

542 A33. Yes. In implementing the CAPM and Implied Risk Premium models, I took into account  
543 risk-free rates expected to be in effect during the period for which the cost of equity is being  
544 set as well as the forecasted MRP.

545 **V. ANALYZING THE COST OF EQUITY**

546 **A. SAMPLE SELECTION**

547 **Q34. Are there unique characteristics of the water industry that are important to consider**  
548 **when estimating the cost of equity?**

549 A34. Yes. The industry is one of the most capital-intensive industries around as measured by the  
550 amount of capital needed to generate one dollar in revenue.<sup>48</sup> This means that the industry  
551 has a capital intensity and therefore a high level of fixed cost relative to its revenue; therefore,  
552 any changes to its revenue will have a large impact on the bottom line. Because variable  
553 cost but not fixed costs can be changed in case revenue decline, a high level of fixed cost  
554 leads to higher variation in net income. Adding to this fact is that the industry is expected to  
555 need very large infrastructure investments going forward. For example, the American  
556 Society of Civil Engineers recently gave the drinking water infrastructure in the U.S. a grade  
557 of C- and stated that \$51 billion in drinking water infrastructure was needed in California  
558 over the next approximately 10 years and about \$434 billion nation-wide.<sup>49</sup> Additional  
559 capital expenditures will add fixed costs and therefore increase the already very high level  
560 of capital intensity and variability in net income in case revenue varies.

561 **Q35. How do you identify sample companies?**

562 A35. To select a comparable sample of water utilities, I began with the universe of publicly traded  
563 water utilities as classified by Value Line.<sup>50</sup> This resulted in an initial group of 10 companies.  
564 From this group, I selected companies that have five years of data available and operate in  
565 the water utility industry. This eliminates Consolidated Water, which “develops and operates

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<sup>48</sup> For example, the dollar revenue generated per each dollar of Property, Plant & Equipment average only 21%, while the average in the electric, gas and water industry is about 30%. Put differently, it requires almost \$5 in property, plant and equipment to generate \$1 of revenue in the water industry as compared to about \$3.33 for the broader utility industry.

<sup>49</sup> [Water Infrastructure | ASCE's 2021 Infrastructure Report Card](#) and [FullReport-CA\\_051019.pdf \(infrastructurereportcard.org\)](#)

<sup>50</sup> The 10 companies are from *Value Line Investment Analyzer as of March 1, 2021*.

566 desalination plants and water distribution systems in areas where naturally occurring supplies  
567 of water are scarce.”<sup>51</sup>

568 In addition, I require that companies have no unique features that render price data  
569 meaningless or difficult to interpret. This leaves nine companies for examination: American  
570 States Water Co., American Water Works, Artesian, California Water Service Group,  
571 Essential Utilities (formerly Aqua), Global Water Resources, Middlesex Water Co., SJW  
572 Corp., and York Water Co. Among these companies, Artesian and Global Water Resources  
573 have no available growth rates or credit rating. Consequently, I consider a Core Sample  
574 consisting of American States Water, American Water Works, California Water Service,  
575 Essential Utilities, Middlesex Water, SJW Group and York water, while Artesian and Global  
576 Water Resources are included in an Expanded Sample. I use the Expanded Sample as a  
577 check on the results from the Core Sample.

578 **Q36. What are the characteristics of the Water Utility Sample?**

579 A36. The Water Utility Sample comprises water utilities whose primary source of revenues and  
580 majority of assets are devoted to provision of water and wastewater services and subject to  
581 regulation. The characteristics of the 9 water utilities comprising the Expanded Sample are  
582 displayed in Figure 8 below. These companies own regulated water utilities or subsidiaries  
583 that may operate in multiple states. The Water Sample is broadly representative of the  
584 regulated water distribution industry from a business risk perspective.

585 Figure 8 reports the sample companies’ annual revenues for the most recent four quarters as  
586 of December 31, 2020 and also report the market capitalization, credit rating, beta and growth  
587 rate. The 2020 annual revenue as well as the market cap was obtained from Bloomberg as  
588 were the recent Standard & Poor’s credit rating and growth estimate.<sup>52</sup> Betas were obtained  
589 from Value Line.

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<sup>51</sup> Value Line Investment Survey, April 9, 2021.

<sup>52</sup> Data reflects information as of company’s Q4, 2020 financial report; e.g., the annual 10-K.

**Figure 8  
Water Sample**

Company	Annual Revenue (Q4 2020) (\$MM)	Regulated Assets	Market Cap. (Q4 2020) (\$MM)	Value Line Beta	S&P Credit Rating	Long-Term Growth Estimate
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	\$488	R	\$2,874	0.65	A+	4.8%
Amer. Water Works	\$3,777	R	\$27,177	0.85	A	6.0%
Artesian Res Corp	\$88	R	\$354	0.75	N/A	N/A
California Water	\$794	R	\$2,672	0.65	A+	8.2%
Essential Utilities	\$1,463	R	\$11,431	0.95	A	8.1%
Global Water Resources Inc	\$39	R	\$334	0.75	N/A	N/A
Middlesex Water	\$142	R	\$1,264	0.70	A	4.8%
SJW Group	\$565	R	\$1,953	0.85	A-	9.4%
York Water Co. (The)	\$54	R	\$619	0.80	A-	5.3%
Core Sample	\$1,040	R	\$6,856	0.78	A	6.7%
Average all companies	\$823	R	\$5,409	0.77	A	6.7%

Sources and Notes:

[1]: Bloomberg as of February 28, 2021.

[2]: Key R - Regulated (80% or more of assets regulated).

[3]: See Schedule No. BV-3 Panels A through I.

[4]: See Schedule No. BV-10

[5]: Bloomberg as of February 28, 2021.

[6]: See Schedule No. BV-5.

590 **Q37. How does the Core and Expanded Sample compare to California-American Water?**

591 A37. First, I note that the Core Sample consists of larger utilities than do the Expanded Sample,  
592 but the degree of regulation, betas, credit ratings, and growth rates are similar. As California  
593 American Water's 2020 revenue was approximately \$250 million,<sup>53</sup> the Company is clearly  
594 smaller than the comparable companies. Additionally, the samples have similar to slightly  
595 higher credit rating than California-American Water's parent, which has a split rating (A  
596 from S&P and Baa1 from Moody's).<sup>54</sup> California-American Water does not currently have  
597 a separate credit rating.

598 I further note that California American Water, unlike the majority of the sample companies,  
599 which have operations across the U.S., operates exclusively in environments that frequently  
600 face severe drought.

<sup>53</sup> Provided by California-American Water.

<sup>54</sup> On April 2, 2019 Moody's downgraded American Water's corporate credit rating.

601 Section VI below discuss some unique risks that California-American Water is facing.

602 **B. CAPITAL STRUCTURE**

603 **Q38. What regulatory capital structure do you recommend for California-American Water**  
604 **in this proceeding?**

605 A38. I recommend that the Commission base rates on the Company's forecasted regulatory capital  
606 structure, consisting of 57.04 percent equity and 42.96 percent debt.<sup>55</sup> I note that this debt  
607 percentage excludes any debt equivalence related to California American Water's 30-year  
608 contract for water supply.

609 **Q39. Please explain this issue.**

610 A39. California American Water has made debt-like financial commitments under a long-term  
611 (30-year) water purchase agreement for the water supply for the Monterey district.<sup>56</sup> These  
612 financial commitments have been made as a part of the water supply portfolio needed for  
613 California American Water's Monterey district to meet regulatory mandates in a timely  
614 manner. However, the purchase agreements is equivalent to debt from a financial leverage  
615 perspective.

616 To assess the magnitude and impact of this additional debt, I calculated the debt equivalence  
617 of the PPA contract using the approach of Standard & Poor's w.r.t., power purchase  
618 agreements. Using the approach of Standard & Poor's, a 30-year fixed payment of  
619 approximately \$10 million annually escalated at the annual inflation rate results in a present  
620 value of approximately \$150 million at Standard & Poor's 7 percent discount rate.<sup>57</sup> Using a  
621 risk-factor of 20%, the additional debt is approximately \$30 million, so that the **financial**

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<sup>55</sup> Direct Testimony of Company witness Mr. Jeffrey T. Linam at Section IV.

<sup>56</sup> See the Direct Testimony of Jeffrey T. Linam at Section IX for details.

<sup>57</sup> See the Direct Testimony of Jeffrey T. Linam at Section X.B for details regarding the contract, "Standard & Poor's Methodology for Imputing Debt for U.S. Utilities Power Purchase Agreements," May 7, 2007 for the methodology and Standard & Poor's Corporate Ratings and Adjustments," April 2019 for the applicable discount rate.

622 leverage with debt equivalence becomes 55 percent equity and 45 percent debt.<sup>58</sup> Simply  
623 put, the financial leverage of California American Water is higher than the forecasted capital  
624 structure as shown in Exhibit BV-6.

625 **Q40. Has the Commission in the past recognized the relevance of debt equivalence?**

626 A40. Yes. The Commission has recognized that the presence of debt equivalence needs to be  
627 considered.<sup>59</sup>

628 Finally, I discuss the expected cost of debt for California American Water in Section VII  
629 below.

630 **C. THE CAPM BASED COST OF EQUITY ESTIMATES**

631 **Q41. Please briefly explain the CAPM.**

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

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

640 
$$r_s = r_f + \beta_s \times MRP \quad (1)$$

641 where  $r_s$  is the cost of capital for investment S;

642  $r_f$  is the risk-free interest rate;

---

<sup>58</sup> As shown in exhibit BV-6, the debt equivalent is \$30.3 million in 2021, which when added to the debt amount results in a capital structure including 54.57% equity and 45.43% debt. The details of the derivation are in Exhibit BV-6. I use 55% equity / 45% debt for financial leverage purposes for simplicity and to be conservative.

<sup>59</sup> See, for example, California Public Utilities Commission, "An Introduction to Debt Equivalence," August 4, 2017 and the decisions cited herein.

643  $\beta_S$  is the beta risk measure for the investment S; and  
644  $MRP$  is the market equity risk premium.

645 The CAPM is a “risk-positioning model” that relies on the empirical fact that investors price  
646 risky securities to offer a higher expected rate of return than safe securities. It says that an  
647 investment whose returns do not vary relative to market returns should receive the risk-free  
648 interest rate (that is the return on a zero-risk security, the y-axis intercept in Figure 1),  
649 whereas the market receives the risk-free rate plus the Market Risk Premium. Further, it says  
650 that the risk premium of a security over the risk-free rate equals the product of the beta of  
651 that security and the Market Risk Premium: the risk premium on a value-weighted portfolio  
652 of all investments, which by definition has average risk.

### 653 **1. Inputs to the CAPM**

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

655 A42. As demonstrated by equation (1), estimating the cost of equity for a given company requires  
656 a measure of the risk-free rate of interest and the Market Risk Premium, as well as a  
657 measurement of the stock’s beta. There are many methodological choices and sources of  
658 data that inform the selection of these inputs. I discuss these issues, along with the finance  
659 theory underlying the CAPM, in Exhibit BV-2. I relied on two sets of inputs in my CAPM  
660 calculations corresponding to a historical and forecasted MRP, respectively. This allowed  
661 me to derive a range of reasonable estimates for the cost of equity capital implied by my core  
662 and expanded water samples.

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

664 A43. I used the forecasted yield on a 20-year Government Bond as the risk-free asset for purposes  
665 of my analysis as the cost of capital set in this proceeding will be in place over three-year  
666 period 2022-2024. Specifically, I rely on the forecasted risk-free rate forecasted by Blue Chip  
667 Economic Indicators, which expect the yield on a 10-year Government Bond will be 2.3  
668 percent by 2023 (the middle of the period for which the ROE is being determined).<sup>60</sup> I adjust

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<sup>60</sup> Blue Chip Economic Indicators, March 2021.

669 this value upward by 50 basis points, which is my estimate of the representative maturity  
670 premium for the 20-year over the 10-year Government Bond.<sup>61</sup> This gives me a risk-free  
671 rate of 2.8 percent.

672 **Q44. What values did you use for the Market Risk Premium?**

673 A44. Like the cost of capital itself, the Market Risk Premium is a forward-looking concept. It is  
674 by definition the premium above the risk-free interest rate that investors can *expect* to earn  
675 by investing in a value-weighted portfolio of all risky investments in the market. The  
676 premium is not directly observable, and must be inferred or forecasted based on known  
677 market information. One commonly used method for estimating the Market Risk Premium  
678 is to measure the historical average premium of market returns over the income returns on  
679 government bonds over some long historical period. *Duff and Phelps* performs such a  
680 calculation of the Market Risk Premium. The average market risk premium from 1926 to  
681 the present (2020) is 7.25 percent. However, investors may require a higher or lower risk  
682 premium, reflecting the investment alternatives and aggregate level of risk aversion at any  
683 given time. As explained in Section III, there is substantial evidence that investors' level of  
684 risk aversion is elevated at this point in time. In recognition of this evidence, together with  
685 forward-looking measurements of the expected Market Risk Premium that are higher than  
686 the long-term historical average, I also performed CAPM calculations using a Market Risk  
687 Premium of 7.53%, which is Bloomberg's February 2021 forecast.<sup>62</sup>

688 **Q45. What is the basis for stating that the current Market Risk Premium is higher than its**  
689 **historical average?**

690 A45. That conclusion is supported by both academic research and empirical market data.  
691 Academic articles that were written in the late 1990s or early 2000s often found that the

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<sup>61</sup> This maturity premium is estimated by comparing the average excess yield on 20-year versus 10-year Government Bonds over the period January 1990 through February 2021, using data from Bloomberg.

<sup>62</sup> Bloomberg currently forecast the U.S. MRP at 8.03 percent over a 10-year Government bond, so I adjust this figure downward for the maturity premium between the 20-year and the 10-year government bond yield. Note that as of the time of the last water cost of capital proceeding the Bloomberg forecasted MRP was approximately 6.95% over the 10-year government bond yield in March 2017. Source: Bloomberg.

692 Market Risk Premium at the time was lower than the historical average based on various  
693 forward-looking models, such as market-wide versions of the DCF model. A recent article  
694 by Duarte and Rosa of the Federal Reserve of New York summarizes many of these models  
695 and also estimates the Market Risk Premium from the models each year from 1960 through  
696 the present.<sup>63</sup> The authors find that the models are converging to provide more consensus  
697 around the estimate and that the average annual estimate of the Market Risk Premium is  
698 consistent with the academic literature and with forward-looking estimates such as  
699 Bloomberg's. Their analysis shows that the U.S. Market Risk Premium was lower than its  
700 long-term historical average in the early 2000s, but is currently at an all-time high. Chart 3  
701 from Duarte & Rosa 2015 was reproduced as Figure 7, which shows the average estimated  
702 Market Risk Premium (over 30-day T-bills) for 20 models.

703 These findings are broadly consistent with the forward-looking Market Risk Premium's  
704 calculated by Bloomberg, albeit a bit higher even after downward adjustment for the maturity  
705 premium.

706 **Q46. What betas did you use for the companies in your sample?**

707 A46. I use Value Line betas in this analysis and show the value for each sample company in Figure  
708 8.

## 709 2. The Empirical CAPM

710 **Q47. Did you use any other CAPM-based model?**

711 A47. Yes. Empirical research has shown that the Empirical Capital Asset Pricing Model  
712 ("ECAPM") tends to perform better as low-beta stocks tend to have higher risk premiums  
713 than predicted by the CAPM and high-beta stocks tend to have lower risk premiums than  
714 predicted.<sup>64</sup> A number of variations on the original CAPM theory have been proposed to  
715 explain this finding, but the observation itself can also be used to estimate the cost of capital

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<sup>63</sup> Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Consensus of Models," *Federal Reserve Bank of New York*, December 2015 (Duarte & Rosa 2015).

<sup>64</sup> See Exhibit BV-2 for references to relevant academic articles.

716 directly, using beta to measure relative risk by making a direct empirical adjustment to the  
717 CAPM.

718 The second variation on the CAPM that I employed makes use of these empirical findings.  
719 It estimated the cost of capital with the equation:

720 
$$r_s = r_f + \alpha + \beta_s \times (MRP - \alpha) \quad (2)$$

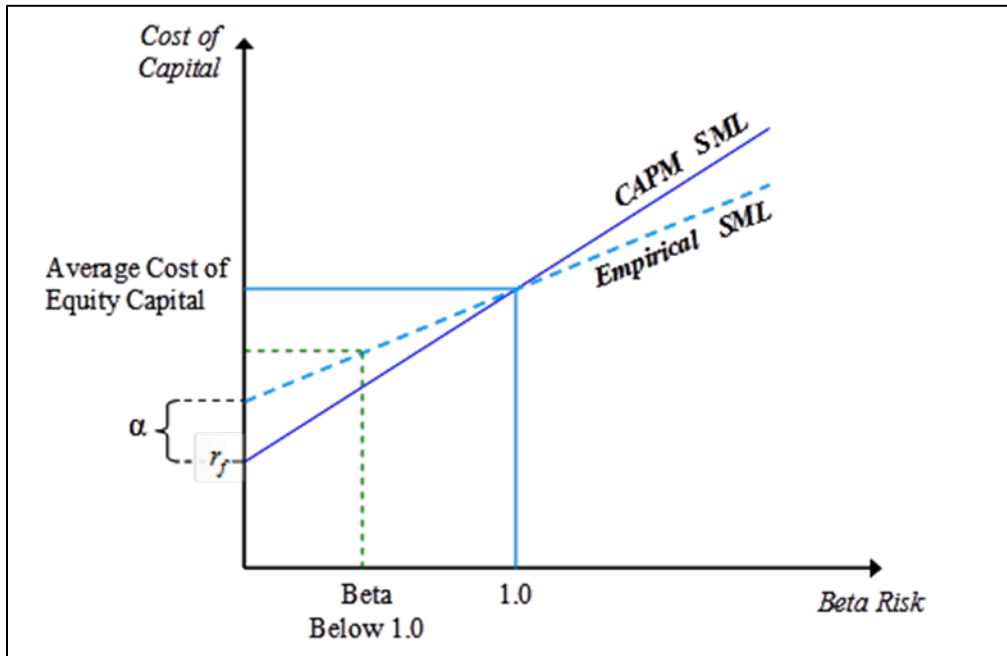
721 where  $\alpha$  is the “alpha” adjustment of the risk-return line, a constant, and the other symbols  
722 are defined as for the CAPM (see equation (1) above).

723 This model is referred to as the ECAPM. The alpha adjustment has the effect of increasing  
724 the intercept but reducing the slope of the Security Market Line in Figure 1, which results in  
725 a Security Market Line that more closely matches the results of empirical tests. In other  
726 words, the ECAPM produces more accurate predictions of eventual realized risk premiums  
727 than does the CAPM.

728 **Q48. Why do you use the ECAPM?**

729 A48. The ECAPM is based on recognizing that the actual observed risk-return line is flatter and  
730 has a higher intercept than that predicted by the CAPM. The alpha parameter ( $\alpha$ ) in the  
731 ECAPM adjusts for this fact, which has been established by repeated empirical tests of the  
732 CAPM. Figure A-3 in Exhibit BV-2 provides a list of empirical studies that have tested the  
733 CAPM and also provides documentation for the magnitude of the adjustment, ( $\alpha$ ).

**Figure 9: The Empirical Security Market Line**



734 **3. Inputs Used in the CAPM Based Models**

735 **Q49. Please summarize the parameters of the scenarios and variations you considered in**  
 736 **your CAPM and ECAPM analyses.**

737 A49. The parameters for the two scenarios are displayed in Figure 10 below.<sup>65</sup>

**Figure 10: Parameters Used in CAPM-based Models**

	Scenario I	Scenario II
Risk-free Rate	2.80%	2.80%
MRP	7.25%	7.53%
Beta	Value Line	Value Line

<sup>65</sup> I note that I in the past have adjusted Scenario I's risk-free rate for an elevated yield spread. While the spread remains elevated, the difference to the long-term average is relatively low, so I conservatively make no adjustment in this filing.

738 **D. FINANCIAL RISK AND THE COST OF EQUITY**

739 **Q50. Are differences in financial leverage important to the estimation of the cost of equity?**

740 A50. Yes. Both the CAPM and the DCF models rely on market data to estimate the cost of equity  
741 for the sample companies, so the results reflect the value of the capital that investors hold  
742 during the estimation period (market values). The allowed ROE is applied to California-  
743 American Water's rate base, which could be financed with a different portion of debt than  
744 the sample companies. Taking differences in financial leverage into consideration does not  
745 change the value of the rate base, but it does consider the fact that the more debt a company  
746 has, the higher is the financial risk associated with an equity investment.

747 **Q51. This concept was illustrated in Figure 2 above. Please describe the methods you use to**  
748 **take differences in financial risk into account.**

749 A51. A common issue in regulatory proceedings (and business valuation in general) is how to  
750 apply data from a benchmark set of comparable securities when estimating a fair return on  
751 equity for the target/regulated company. It may be tempting to simply estimate the cost of  
752 equity capital for each of the sample companies (using one of the above approaches) and  
753 average them. After all, the companies were chosen to be comparable in their business risk  
754 characteristics, so why would an investor necessarily prefer equity in one to the other (on  
755 average)?

756 The problem with this argument is that it ignores the fact that underlying asset risk (i.e., the  
757 risk inherent in the lines of business in which the firm employs its assets) for each company  
758 is typically divided between debt and equity holders. The firm's debt and equity are therefore  
759 financial derivatives of the underlying asset return, each offering a differently structured  
760 claim on the cash flows generated by those assets. Even though the risk of the underlying  
761 assets may be comparable, a different capital structure splits that risk differently between  
762 debt and equity holders. The relative structures of debt and equity claims are such that higher  
763 degrees of debt financing increase the variability of returns on equity, *even when the*  
764 *variability of asset returns remains constant*. As a consequence, otherwise identical firms

765 with different capital structures will impose different levels of risk on their equity holders.  
 766 Stated simply, increased leverage adds financial risk to a company's equity.<sup>66</sup>

767 To develop insight for the manner in which financial leverage affects the risk of equity, it is  
 768 helpful to consider a concrete example. Figure 11 and Figure 12 below demonstrate the  
 769 impact of leverage on the risk and return for equity by comparing equity's risk when a  
 770 company uses no debt to finance its assets, and when it uses a 50-50 capital structure (i.e., it  
 771 finances 50 percent of its assets with equity and 50 percent with debt). For illustrative  
 772 purposes, the figures assume that the cash flows will be either \$5 or \$15 and that these two  
 773 possibilities have the same chance of occurring.

**Figure 11: All Equity Capital Structure**

	Asset			ROE	
	Cash Flow	Debt Service	Equity Dividend		
\$100	↗ 1/2	\$15	\$0	\$15	15/100 = 15%
	↘ 1/2	\$5	\$0	\$5	5/100 = 5%
				$E(ROE) = 10\%$	
				$\sigma(ROE) = 5\%$	

**Figure 12: 50/50 Capital Structure**

	Asset			ROE	
	cash flow	Debt Service	Equity Dividend		
\$100	↗ 1/2	\$15	\$2.50	\$12.50	12.50/50 = 25%
	↘ 1/2	\$5	\$2.50	\$2.50	2.50/50 = 5%
				$E(ROE) = 15\%$	
				$\sigma(ROE) = 10\%$	

774 In the figures,  $E(ROE)$  indicates the mean return and  $\sigma(ROE)$  represents the deviation of  
 775 returns from that mean. This simple example illustrates that the introduction of debt  
 776 increases both the mean (expected) return to equity holders and the variance of that return,  
 777 even though the firm's expected cash flows—which are a property of the line of business in  
 778 which its assets are invested—are unaffected by the firm's financing choices. The “magic”  
 779 of financial leverage is not magic at all—leveraged equity investors can only earn a higher  
 780 return because they take on greater risk.

---

<sup>66</sup> I refer to this effect in terms of *financial risk* because the additional risk to equity holders stems from how the company chooses to finance its assets. In this context financial risk is distinct from and independent of the *business risk* associated with the manner in which the firm deploys its cash flow generating assets. The impact of leverage on risk is conceptually no different than that faced by a homeowner who takes out a mortgage. The equity of a homeowner who finances his home with 90% debt is much riskier than the equity of one who only finances with 50% debt.

781 **Q52. Can you summarize the methods used to account for differences in financial risk?**

782 A52. Yes. Because several different approaches are discussed in finance textbooks, I use three  
783 common approaches to span the plausible range of outcomes. First, if the companies in a  
784 sample are comparable in terms of the systematic risks of the underlying assets, then the  
785 overall cost of capital of each company should be about the same across companies (except  
786 for sampling error), so long as they do not use extreme leverage or no leverage. Thus, within  
787 a range of capital structures, the weighted average cost of capital will be the same for the  
788 sample used to estimate the cost of capital and for California-American Water. Second,  
789 alternative approaches based on the work of Professor Hamada account for the impact of  
790 financial risk by examining the impact of leverage on beta, which inherently means working  
791 within the CAPM framework. Hamada adjustment procedures—so-named for Professor  
792 Robert S. Hamada who contributed to their development<sup>67</sup>—are ubiquitous among finance  
793 practitioners when using the CAPM to estimate discount rates. In my CAPM analysis I  
794 employ two varieties of Hamada adjustments to beta: one that directly incorporates taxes and  
795 one that does not.

796 The theoretical and methodological details of these financial risk adjustment procedures are  
797 explained in the Technical Appendix (Ex. BV-2) to my testimony, and the mechanics of their  
798 implementation are shown in my workpapers and in Ex. BV-3.

799 **Q53. Can you summarize the results from applying the CAPM-based methodologies?**

800 A53. Yes. The results, adjusted to California-American Water's financial leverage, are presented  
801 in Figure 13 below.<sup>68</sup>

---

<sup>67</sup> Hamada, R.S., "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stock", *The Journal of Finance* 27(2), 1971, pp. 435–452.

<sup>68</sup> Tables and supporting schedules detailing my cost of capital calculations are contained in Exhibit BV-3.

**Figure 13: Water Utility Sample CAPM-Based Results**

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
<b>Core Water Sample</b>		
<i>Financial Risk Adjusted Method</i>		
CAPM	10.6%	10.8%
ECAPM ( $\alpha = 1.5\%$ )	11.0%	11.3%
<i>Hamada Adjustment Without Taxes</i>		
CAPM	10.2%	10.5%
ECAPM ( $\alpha = 1.5\%$ )	10.2%	10.5%
<i>Hamada Adjustment With Taxes</i>		
CAPM	9.8%	10.1%
ECAPM ( $\alpha = 1.5\%$ )	9.9%	10.1%
<b>Expanded Water Sample</b>		
<i>Financial Risk Adjusted Method</i>		
CAPM	10.4%	10.6%
ECAPM ( $\alpha = 1.5\%$ )	10.8%	11.1%
<i>Hamada Adjustment Without Taxes</i>		
CAPM	10.0%	10.3%
ECAPM ( $\alpha = 1.5\%$ )	10.0%	10.3%
<i>Hamada Adjustment With Taxes</i>		
CAPM	9.7%	9.9%
ECAPM ( $\alpha = 1.5\%$ )	9.7%	10.0%

Sources and Notes:

[1]: Long-Term Risk Free Rate of 2.80%, Long-Term Market Risk Premium of 7.25%.

[2]: Long-Term Risk Free Rate of 2.80%, Long-Term Market Risk Premium of 7.53%.

802 **Q54. How do you interpret the results in Figure 13?**

803 A54. Based on the results in the table above, I consider a range of 9¾ to 11 percent reasonable for  
804 a water utility. This range is supported by both the Core and Expanded Sample, but does not  
805 consider any California American Water specific risks.

806 **E. THE DCF BASED ESTIMATES**

807 **1. Single- and Multi-Stage DCF Models**

808 **Q55. Can you describe the DCF approach to estimating the cost of equity?**

809 A55. The DCF model attempts to estimate the cost of capital for a given company directly, rather  
810 than based on its risk relative to the market as the CAPM does. The DCF method simply  
811 assumes that the market price of a stock is equal to the present value of the dividends that its  
812 owners expect to receive. The method also assumes that this present value can be calculated  
813 by the standard formula for the present value of a cash flow—literally a stream of expected

814 “cash flows” discounted at a risk-appropriate discount rate. When the cash flows are  
815 dividends, that discount rate is the cost of equity capital:

$$816 \quad P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots + \frac{D_T}{(1+r)^T} \quad (3)$$

817 Where  $P_0$  is the current market price of the stock;

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

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

820  $r$  is the cost of equity capital.

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

825 Many DCF applications assume that the growth rate will remain constant forever, so the  
826 formula can be rearranged to estimate the cost of capital. Specifically, the implied DCF cost  
827 of equity can then be calculated using the well-known “DCF formula” for the cost of capital:

$$828 \quad r = \frac{D_1}{P_0} + g = \frac{D_0}{P_0} \times (1 + g) + g \quad (4)$$

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

831 Equation (4) says that if equation (3) holds, the cost of capital equals the expected dividend  
832 yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the  
833 single-stage DCF model; it is also known as the Gordon Growth model.<sup>69</sup>

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<sup>69</sup> The Gordon Growth model is among the models the CPUC has reviewed in the past.

834 **Q56. Are there different versions of the DCF model?**

835 A56. Yes. There are many alternative versions, notably (i) multi-stage models, (ii) models that  
836 use cash flow rather than dividends, or versions that combine aspects of (i) and (ii).<sup>70</sup> One  
837 such alternative expands the Gordon Growth model to three stages. In the multistage model,  
838 earnings and dividends can grow at different rates, but must grow at the same rate in the  
839 final, constant growth rate period.<sup>71</sup>

840 A common implementation of the multi-stage DCF is to assume that companies grow their  
841 dividend for five years at the forecasted company-specific rate of earnings growth, the  
842 growth then transitioning to over the next five years toward a forecast of the growth rate of  
843 the overall economy (i.e., the long-term GDP growth rate forecasted to be in effect 10 years  
844 or more into the future). While variations of this model have historically been used many of  
845 its features are problematic in the current environment. In particular: (i) The current dividend  
846 yield may be lower than expected going forward as the water utility industry is seeing very  
847 high price earnings ratios plausibly due to the very low interest rates,<sup>72</sup> and (ii) the current  
848 GDP forecast is lower than its historical average. Thus, the combination of these two  
849 elements is likely to lead to unusually low DCF estimates of the cost of equity. As a result,  
850 I believe the result merits little to no weight at this point in time.

851 **Q57. What are the relative strengths and weaknesses of the DCF versus CAPM based**  
852 **methodologies for estimating the cost of equity capital?**

853 A57. Current market conditions affect all cost of capital estimation models to some degree, but  
854 the DCF model has at least one advantage over the CAPM-based models as it includes

---

<sup>70</sup> The Surface Transportation Board uses a cash flow based model with three stages. See, for example, Surface Transportation Board Decision, “STB Ex Parte No. 664 (Sub-No. 1),” Decided January 23, 2009. Confirmed in STB Docket EP No. 664 (Sub-No. 2), October 31, 2016 and STB Docket EP No. 664 (Sub-No. 4), June 23, 2020.

<sup>71</sup> See Ex. BV-2 for further discussion of the various versions of the DCF model, as well as the details of the specific versions I implement in this proceeding.

<sup>72</sup> See, for example, Morningstar, “Meet CAPE’s Older Sister CATY: Using “Total Payout Yield” to Derive Better Equity Return Forecasts” by Philip Straehl, 2016.

855 contemporaneous stock prices and forward-looking growth, whereas the CAPM relies on  
856 historical data to estimate systematic risk and (in some cases) the market risk premium.

## 857 2. DCF Inputs

### 858 **Q58. What growth rate information did you use?**

859 A58. I looked to a sample of investment analysts' forecasted earnings growth rates for companies  
860 in my samples. I used investment analyst forecasts of company-specific growth rates sourced  
861 from *Value Line* and Thomson Reuters *IBES*. (Neither *IBES* nor *Value Line* provides growth  
862 forecasts for the two additional companies in the Expanded Sample: Artesian and Global  
863 Water Resources. Further, Middlesex, SJW Corp, and York have no *IBES* growth rates.<sup>73</sup>)  
864 For the multi-stage version, I also use Blue Chip growth forecasts.

865 Additionally, I relied on the dividend yields of the companies, which I estimate using the  
866 most recently available dividend information and the average of the last 15 days of stock  
867 prices. As the single largest advantage of the DCF model is that it uses current market  
868 information, I find it is important to use a relatively short time period to determine the  
869 dividend yield, while avoiding the bias caused by using any one day. I believe a 15-day  
870 average accomplishes that goal. Because the stock prices of utilities currently are higher  
871 than they historically have been and because some companies engage in share buybacks, the  
872 dividend yield underestimates the yield on cash distributions to investors. I have not adjusted  
873 for this in my calculations and therefore believe my estimates to be conservative.

### 874 **Q59. Please address the input data in the DCF model.**

875 A59. The Gordon Growth / single-stage DCF models require forecast growth rates that reflect  
876 investor expectations about the pattern of dividend growth for the companies over a  
877 sufficiently long horizon, but estimates are typically only available for three to five years.

---

<sup>73</sup> Certain sources that report *IBES* estimates—including Yahoo! Finance—do currently show growth rate projections for these companies. However, my analysis of detailed information on the individual estimates underlying the *IBES* consensus provided by Thomson Reuters (via their Eikon subscription data service) reveals that these growth rates are based on “stale” estimates.

878 One issue with the data is that it includes solely dividend payments as cash distributions to  
879 shareholders, while some companies also use share repurchases to distribute cash to  
880 shareholders. To the extent that companies in my samples use share repurchases, the DCF  
881 model using dividend yields will underestimate the cost of equity for these companies.

882 A second issue is that the flight to quality has resulted in higher than usual stock prices for  
883 water utilities and hence lower than usual dividend yields. As a result, the dividend yield  
884 may be downward biased. The multi-stage DCF model additionally requires a measure of  
885 the long-term expected GDP growth. While I commonly report the results from using the  
886 Blue Chip forecasted GDP growth, the current GDP growth forecast is substantially below  
887 what historically has been the case. Therefore, I consider the multi-stage model should be  
888 granted very limited weight at this time.

### 889 **3. Share Buybacks and the DCF Model**

890 **Q60. Are there other important considerations regarding the implementation of the DCF**  
891 **models for water utilities?**

892 A60. Yes. Several water utilities have engaged in share buybacks, which means that they have  
893 distributed cash to shareholders through means other than dividends. Therefore, a model  
894 that relies on dividends only underestimates how much cash shareholders have received. In  
895 particular, the dividend yield is lower than the cash yield and as a result the estimated return  
896 on equity is too low.

897 **Q61. Please explain how you determine the implications of share buybacks.**

898 A61. Looking at the sample companies' annual reports and news announcements, I find that two  
899 companies have recently engaged in share buybacks: American Water Works<sup>74</sup> and York  
900 Water.<sup>75</sup> American Water Works and York Water have ongoing non-dilutive share buyback  
901 programs authorizing the repurchase of specified numbers of outstanding shares. The  
902 presence of the buyback programs means that the standard calculation of the DCF-based cost

---

<sup>74</sup> American Water Works 2020 10-K, p. 48 indicates the company bought back shares 2015-2019.

<sup>75</sup> York Water 2020 Annual Report, p. 3 indicates the company bought back shares 2013-2020.

903 of equity is too low, so that the estimated cost of equity is downward biased. I do not make  
904 any adjustment for this fact in the estimation.

905 **Q62. What are the DCF-based cost of equity estimates for the sample?**

906 A62. The results are presented in Figure 14 below.<sup>76</sup>

**Figure 14: Range of DCF Results for Water Utility Sample**

	Single-stage	Multi-stage
Core Water Sample	10.0%	7.1%
Expanded Water Sample	10.0%	7.1%

907 I believe that the simple DCF is a much more reasonable estimate at the current time than is  
908 the multi-stage DCF. The multi-stage DCF is impacted by the low dividend yields that fail  
909 to consider the share buybacks and the relationship between low interest rates, flight to  
910 quality and share prices. Therefore, I believe the single-stage DCF should receive the most  
911 attention at this point in time and consequently the model indicates a ROE of about 10 percent  
912 for the water utility industry.

913 **F. THE IMPLIED RISK PREMIUM MODEL ESTIMATES**

914 **Q63. Did you estimate the cost of equity that results from an analysis of risk premiums**  
915 **implied by ROE's that were derived in past utility rate cases?**

916 A63. Yes. In this type of analysis, which I am calling the “implied risk premium model” to avoid  
917 potential confusion with more a broader set of approaches that are often categorized under  
918 the label of “risk premium” approaches, the cost of equity capital for utilities is estimated  
919 based on the historical relationship between ROE's derived in past utility rate cases and the  
920 risk-free rate of interest at the time the ROE's were derived. These estimates add a “risk  
921 premium” implied by this relationship to the relevant (prevailing or forecast) risk-free  
922 interest rate:

---

<sup>76</sup> Tables and supporting schedules detailing my cost of capital calculations are included in Ex. BV-3.

923

$$\text{Cost of Equity} = r_f + \text{Risk Premium}$$

924 **Q64. What are the merits of this approach?**

925 A64. First, it estimates the cost of equity from regulated entities as opposed to publicly-traded  
926 holding companies, so that the relied upon figure is directly applicable to a rate base. Second,  
927 the allowed returns are clearly observable to market participants, who will use this one data  
928 input to make investment decisions, so that the information is at the very least a good check  
929 on whether the return is comparable to that of other investments. Third, I analyze the spread  
930 between the allowed ROE at a given time and the then-prevailing interest rate to ensure that  
931 I properly consider the interest rate regime at the time the ROE was awarded. This  
932 implementation ensures that I can compare allowed ROE granted at different times and under  
933 different interest rate regimes.

934 **Q65. How did you use rate case data to estimate the risk premiums for your analysis?**

935 A65. I used rate case data for water utilities from 2007 through 2020. The data was obtained from  
936 SNL. Using this data, I compared (statistically) the average allowed rate of return on equity  
937 granted by U.S. state regulatory agencies in water utility rate cases to the average 20-year  
938 Treasury bond yield that prevailed in each quarter.<sup>77</sup>

939 I calculated the allowed utility “risk premium” in each quarter as the difference between  
940 allowed returns and the Treasury bond yield, since this represents the compensation for risk  
941 allowed by regulators. Then I used the statistical technique of ordinary least squares (“OLS”)   
942 regression to estimate the parameters of the linear equation:

$$\text{Risk Premium} = A_0 + A_1 \times (\text{Treasury Bond Yield}) \quad (5)$$

944 I derived my estimates of  $A_0$  and  $A_1$  using standard statistical methods (OLS regression) and  
945 find that the regression has a high degree of explanatory power in a statistical sense ( $R^2 =$   
946  $0.93$ ) and the parameter estimates,  $A_0 = 8.87$  percent and  $A_1 = -0.708$ , are statistically

---

<sup>77</sup> 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.

947 significant. The negative slope coefficient reflects the empirical fact that regulators grant  
948 smaller risk premiums when risk-free interest rates (as measured by Treasury bond yields)  
949 are higher. This is consistent with past observations that the premium investors require to  
950 hold equity over government bonds increases as government bond yields decline. In the  
951 regression described above the risk premium declined by less than the increase in Treasury  
952 bond yields. Therefore, the allowed ROE on average declined by less than 100 basis points  
953 when the government bond yield declined by 100 basis points. Based on this analysis, I find  
954 that the risk premium model results applied using current treasury yields are consistent with  
955 an ROE of about 9.7 percent for the average water utility.

956 I believe the 9.7 percent that I determined using data from 2007 to 2020 underestimates the  
957 cost of equity at this point in time, because statistical analyses of similar data in the natural  
958 gas and electric industry have shown that more recent periods imply a lower (more negative)  
959  $A_1$  coefficient, so that the estimated ROE has become less sensitive to the risk-free rate.<sup>78</sup>

960 **Q66. What conclusions did you draw from your risk premium analysis?**

961 A66. While risk premium models based on historical allowed returns are not underpinned by  
962 fundamental finance principles in the manner of the CAPM or DCF models, I believe this  
963 analysis, can provide useful benchmarks for evaluating whether the estimated ROE is  
964 consistent with recent practice. My implied risk premium model cost of equity estimates  
965 demonstrates that the results of my DCF and CAPM analyses are broadly in line with the  
966 actions of utility regulators even if my risk premium model likely underestimate the current  
967 ROE. Because the risk premium analysis as implemented takes into account the interest rate  
968 prevailing during the quarter the decision was issued, it provides a useful benchmark for the  
969 cost of equity in any interest environment.

970 **Q67. Please summarize the ROE results from your financial models**

971 A67. The results for a generic water utility are summarized in Figure 15 below, which shows a  
972 range of approximately 9¾ to 11 percent for water utilities.

---

<sup>78</sup> See the discussion in Q/A 28 above.

**Figure 15**  
Summary of Estimation Results

	Low Estimate	High Estimate
CAPM / ECAPM	9¾%	11%
DCF	n/a	10%
Risk Premium	9.7%	Greater than 9.7% <sup>1)</sup>

973                   <sup>1)</sup> Based on analyses for other utilities, a more recent period results in a  
974                   slightly higher ROE.

975 **VI. CALIFORNIA-AMERICAN WATER’S SPECIFIC CHARACTERISTICS AND THE**  
976 **COST OF EQUITY**

977 **Q68. Does California-American Water have risks characteristics that differ from those of**  
978 **the sample companies?**

979 A68. Yes. California-American Water faces four categories of unique business risks. First,  
980 California-American Water has recently had (and expects to have going forward) very high  
981 capital expenditures, which, as discussed below, increases the variability in income and, in  
982 an environment of declining usage, the amount of capital that has to be recovered per gallon  
983 of water delivered. Second, the Company has in the past not been able to earn its allowed  
984 return on equity. Third, California-American Water faces some unique challenges regarding  
985 the timely recovery of and return on certain costs, which makes it even more challenging to  
986 earn the allowed ROE. Fourth, California-American Water is set to lose its WRAM at the  
987 end of 2023 so that the Company will face the risk of variability in water consumption during  
988 part of the upcoming regulatory period. Because California American Water consistently  
989 has seen lower than expected water consumption, the variability around revenues is  
990 asymmetric. I discuss each of these risks below as well as the impact on my ROE  
991 recommendation.

992 **A. CAPITAL EXPENDITURES, CAPITAL INTENSITY AND OPERATING LEVERAGE**

993 **Q69. What specifically do you study in this section?**

994 A69. I analyze California American Water’s capital expenditure relative to those of the sample  
995 and also consider whether the Company’s relative proportion of fixed is different.  
996 Specifically, I compare the recent trend in capital expenditures across the sample and  
997 California American Water using public data for the comparable companies and California

998 American Water provided data for the Company. I also consider the capital intensity of the  
999 company as measured by the dollar revenue generated relative to the property, plant and  
1000 equipment. Finally, operating leverage measures the degree to which variability in revenues  
1001 impact variability in operating income and is an implicit measure of the magnitude of fixed  
1002 costs. The more a variation in operating revenue impacts operating income the higher the  
1003 level of business risk.<sup>79</sup>

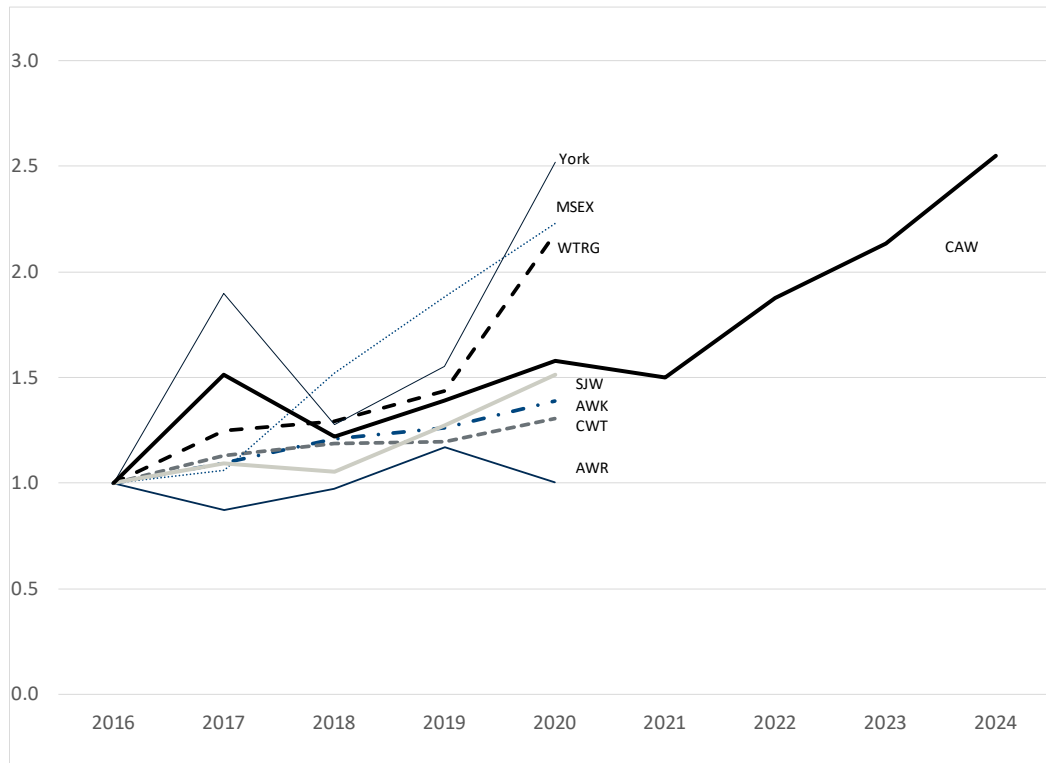
1004 **Q70. What do you find regarding California-American Water's capital expenditures?**

1005 A70. The Company has provided me with information regarding its recent historical and forecast  
1006 future investments in utility plant assets. To compare the Company's historical expenditures  
1007 to contemporaneous investment levels for the publicly-traded sample companies, I  
1008 normalized the annual capital expenditures of each company by its net property plant and  
1009 equipment balance as of year-end 2016. This provides a measure of how substantial each  
1010 company's investment is relative to its existing plant in service (as of 2016), and allows for  
1011 a meaningful comparison of capital expenditures among the companies. As shown in Figure  
1012 16, California-American Water's capital expenditures have recently been comparable to the  
1013 average but are expected to increase substantially.

---

<sup>79</sup> Brealey, Myers, and Allen, "Principles of Corporate Finance," 10<sup>th</sup> Edition, 2011, pp. 248-249.

**Figure 16**  
**Capital Expenditures as a Percentage of Net Plant Normalized to 2016<sup>80</sup>**



1014 Source: Capital IQ and California American Water. Note that 2020 data may not be fully  
 1015 audited.

1016 **Q71. How does a high and increasing level of capital expenditure increase business risk?**

1017 A71. Increased capital expenditures increase fixed costs (e.g., depreciation) and the higher fixed  
 1018 costs are relative to total costs, the higher the company's operating leverage. As illustrated  
 1019 in Figure 17, operating leverage increases the company's exposure to income fluctuations.  
 1020 In the example below, I consider two utilities: Utility A and Utility B. Each utility as a  
 1021 benchmark expects revenues of \$1,000 and total costs (fixed and variable) of \$900.  
 1022 However, while fixed costs are only 40% of Utility A's revenue, they make up 60% of Utility  
 1023 B's revenue. At the same time, variable costs are 50% of revenues for Utility A but only

<sup>80</sup> CAW's forecasted capital expenditures includes MPWSP Phase I additions, Other CapEx, and Acquisitions. The latter is very small but included for comparability to the proxy companies' capital expenditures. The depicted CapEx does not include AFUDC.

1024 30% of revenues for Utility B. In the top panel of Figure 17, the expected outcome is shown  
 1025 and illustrates that both entities expect to earn a net income of \$100.

1026 However, if revenues decline by 10% as shown in the bottom panel of the figure, Utility B  
 1027 will experience a greater shock to its income (equity return) than Utility A. This is because  
 1028 variable costs can be expected to decline in proportion to revenue, but fixed costs are just  
 1029 that—fixed. Therefore, a higher degree of operating leverage (i.e., a higher proportion of  
 1030 fixed costs in the cost structure) increases risk to equity holders all else equal. This is  
 1031 important in the context of determining California-American Water’s allowed ROE because  
 1032 the Company’s high and increasing level of capital expenditures amplifies operating  
 1033 leverage, making the Company’s income (and therefore its equity return) more volatile.

**Figure 17**  
**Illustration of Risk Imposed by Operating Leverage**

		Utility A	Utility B
Revenue	[a]	\$1,000	\$1,000
Variable Costs	[b]	(\$500)	(\$300)
Fixed Costs	[c]	(\$400)	(\$600)
Net Income	[d] = sum([a]:[c])	\$100	\$100
<i>As Revenue and Variable Costs Decline by 10%...</i>			
Revenue	[e] = [a] x (90%)	\$900	\$900
Variable Costs	[f] = [b] x (90%)	(\$450)	(\$270)
Fixed Costs	[g] = [c]	(\$400)	(\$600)
Net Income	[h] = sum([e]:[g])	\$50	\$30
Decline in Income	[i] = [h] - [d]	(\$50)	(\$70)
Percentage Decline in Income	[j] = [i] / [d]	-50%	-70%

1034 **Q72. Do you have any evidence that California American Water has high operating**  
 1035 **leverage?**

1036 A72. Yes. As shown in Figure 18 below, California American Water has lower operating income  
 1037 to operating revenues and hence higher operating leverage than the average of the sample.  
 1038 Consequently, it is more exposed to variations in revenue.

**Figure 18: Operating Leverage for California American Water and Sample**

		2016	2017	2018	2019	2020
Amer. States Water	[A]	0.78	0.79	0.76	0.79	0.79
Amer. Water Works	[B]	0.87	0.88	0.87	0.87	0.87
California Water	[C]	0.72	0.75	0.73	0.72	0.74
Essential Utilities	[D]	0.87	0.87	0.86	0.87	0.85
Middlesex Water	[E]	0.75	0.75	0.74	0.72	0.73
SJW Group	[F]	0.78	0.77	0.75	0.70	0.75
York Water Co. (The)	[G]	0.83	0.80	0.79	0.79	0.79
Sample Average	[H]	0.80	0.80	0.79	0.78	0.79
California-American Water	[I]	0.79	0.77	0.75	0.76	0.75

Sources and Notes:

[A] - [G]: S&P Capital IQ

[H]: Average ( [A] - [G] )

[I]: California American Water

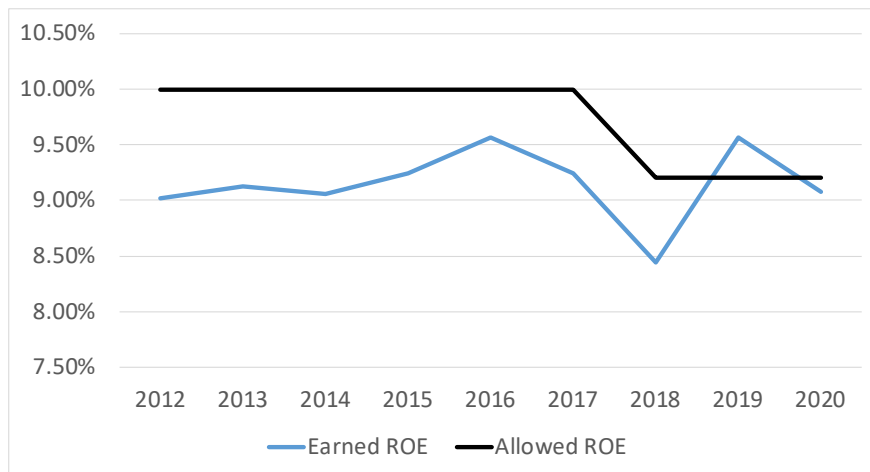
1039

1040 **B. EARNING THE ALLOWED ROE**

1041 **Q73. What evidence do you have the California-American Water has been unable to earn its**  
 1042 **allowed ROE in the past?**

1043 A73. Figure 19 below shows the Company’s allowed and Earned Return on Equity since 2012. It  
 1044 is clear from the figure that California-American Water has earned its allowed ROE only in  
 1045 one year, while it earned below its allowed return in all other years and often by a non-trivial  
 1046 amount. The average under earning is 53 basis points.

**Figure 19: Allowed and Earned ROE**



1047

Source: California American Water. 2020 data have yet to be audited.

1048 **Q74. Why does the consistent under earning matter?**

1049 A74. Recall that the cost of capital is “the expected rate of return in capital markets on alternative  
1050 investments of equivalent risk” and that it refers to the probability-weighted average over all  
1051 possible outcomes. Therefore, if the distribution of actual earnings around the allowed ROE  
1052 is not symmetric—meaning, is approximately an equal amount above and below the allowed  
1053 ROE—investors will no longer earn the allowed ROE on average. Put differently, the  
1054 Company appears to face asymmetric risks. Such risks are plausibly becoming more  
1055 pronounced as the drought conditions in California has meant that the Company consistently  
1056 has seen lower than expected water sales rather than a variation around the expected level.<sup>81</sup>  
1057 I explain the impact of asymmetric risk in more detail below.

1058 **C. UNIQUE FINANCIAL CIRCUMSTANCES – ASYMMETRIC RISK**

1059 **Q75. Is California-American Water subject to any other unique financial circumstances or**  
1060 **risk factors?**

1061 A75. Yes. The presence of a number of long-term assets, which earn a return below California-  
1062 American Water’s weighted cost of capital exposes the Company to asymmetric risks as  
1063 discussed above. As these risks are discussed in the Direct Testimony of Jeffrey Linam at  
1064 Section VIII, I shall only provide some examples and their impact.

1065 **Q76. What are some of the larger assets that earn below the weighted cost of capital?**

1066 A76. One example is the presence of a large regulatory asset, which earn only a commercial paper  
1067 rate, which is well below the weighted cost of capital that the Company has and even well  
1068 below long-term interest rates. California-American cannot finance long-term assets with  
1069 commercial paper and therefore incurs a financing loss each and every year on the financing  
1070 of this asset. Other examples are discussed in the Direct Testimony of Mr. Jeffrey Linam at  
1071 Section VI. The presence of such deferral accounts postpones California-American Water’s  
1072 recovery of capital and hence weakens its financial position. From a financial leverage

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<sup>81</sup> See the Direct Testimony of Jeffrey T. Linam at Section VI for details regarding the drought conditions and the impact on deferral accounts.

1073 perspective, California American Water does not have 57.04 or even 55 percent equity but a  
1074 smaller amount as these assets are excluded from the capital structure relied upon here.

1075 Further, I note that the Company has ongoing commitments to providing water in the  
1076 Monterey area, but faces challenges given the water shortages and need to reduce the water  
1077 taken from the Carmel River.<sup>82</sup> Due to the water shortages, California American Water has  
1078 committed to purchase water from a groundwater replenishment project. Such financial  
1079 commitments put pressure on the Company's cash flow and hence credit metrics. Lastly, I  
1080 note that the Company has ongoing environmental requirements that need to be supported  
1081 with capital.<sup>83</sup>

1082 **Q77. How do such asymmetric risks impact the cost of equity?**

1083 A77. First, it is important to recognize that asymmetric risks are not included in the estimated cost  
1084 of equity. Such risks only impact the Company in a negative manner – there are no offsetting  
1085 positive earnings opportunities. Consequently, for California American Water to be allowed  
1086 an opportunity to, on average, earn its allowed ROE, the asymmetries need to be removed or  
1087 California American Water needs to be allowed a higher ROE.

1088 **D. LOSING THE FULL DECOUPLING MECHANISM (WRAM)**

1089 **Q78. How does the fact the WRAM will cease to be in effect in 2024 affect California**  
1090 **American Water?**

1091 A78. Because the WRAM has served to adjust California American Water's revenue for losses  
1092 due to water conservation and the risk of under recovery of the revenue requirement as a  
1093 result of the implementation of an inclining block rate design, the elimination of the  
1094 mechanism will introduce additional variations in California American Water's revenue and  
1095 consequently net income.

1096 Importantly, the WRAM was introduced to provide an incentive for water conservation in  
1097 combination with a tiered rate design. For example, a report by the Commission makes clear

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<sup>82</sup> See the Direct Testimony of Jeffrey T. Linam at Section V.

<sup>83</sup> See the Direct Testimony of Jeffrey T. Linam at Section V and XI for details.

1098 that the WRAM was implemented in combination with tiered rates to ensure utilities had no  
1099 disincentive to conserve water.<sup>84</sup> The same report also notes that the 3-year rate cycle has  
1100 resulted in increases to WRAM balances.<sup>85</sup> The mechanism was instituted to eliminate a  
1101 risk of water sales being asymmetric imposed on water utilities to obtain the policy goal of  
1102 reductions in water consumption. a risk that had been imposed on water utilities to obtain the  
1103 policy goal of lower water consumption. As the WRAM is eliminated the risks are coming  
1104 back.

1105 **Q79. Does the unique characteristics of the WRAM matter?**

1106 A79. Yes. The fact that California American Water consistently has seen lower than expected  
1107 water demands means that the WRAM has served to ameliorate an asymmetric risk from the  
1108 Company. As this asymmetric risk is now re-introduced, it will necessarily impose  
1109 additional negative income volatility on the Company.

1110 As noted above, asymmetric risk is not captured in the cost of equity estimate and therefore  
1111 needs to be considered separately; e.g., though a regulatory mechanism that eliminate the  
1112 asymmetry or perhaps through compensation for such risks, such as allowing a higher cost  
1113 of capital to compensate investors.

1114 **Q80. Isn't it true that Brattle experts have testified that the presence of a decoupling**  
1115 **mechanism does not impact the cost of capital?**

1116 A80. Yes. Several Brattle experts have authored papers regarding the relationship between the  
1117 presence of a decoupling mechanism and the overall weighted average cost of capital.<sup>86</sup>  
1118 These studies found that statistically decoupling cannot be said to have an impact on the cost  
1119 of capital – that is, the studies cannot measure an impact on the **systematic risk** of regulated  
1120 utilities in the energy sector.<sup>87</sup>

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<sup>84</sup> Stephen St. Marie and Marzia Zafar, “Water Rates: Scenario Planning,” Published by the California Public Utilities Commission, pp. 7-8.

<sup>85</sup> *Ibid.*, p. 8.

<sup>86</sup> For example, Wharton et al., “The Impact of Decoupling on Cost of Capital: An Empirical Investigation,” 2011 and Joe Wharton and Michael J. Vilbert, “Decoupling and the Cost of Capital,” *The Electricity Journal* vol. 28. 2015.

<sup>87</sup> The studies rely on natural gas LDCs and electric utilities.

1121 I emphasize the word **systematic risk** above, because the financial models we use to estimate  
1122 the cost of equity look to systematic risk rather than asymmetric risk and the practical  
1123 implementation of the WRAM has resulted in the removal of an asymmetric risk from  
1124 California American Water. Thus, the removal of the WRAM **will introduce an**  
1125 **asymmetric risk** on California American Water. Such risks are, as noted above, not  
1126 included in the estimated cost of equity. Consequently, the Brattle expert's papers do not  
1127 address asymmetric risk and neither do my results for the sample companies take that into  
1128 account.

1129 **Q81. Please address the impact of the discussion above on California American Water**

1130 A81. The WRAM was designed to address the fact that actual water sales might deviate from  
1131 expected sales, which were derived under average conditions. Once an asymmetric risk of  
1132 highly inverted rate designs and heavy conservation measures were implemented to get  
1133 discretionary water sales lower, this could not and was not considered in the water sales  
1134 forecast. Thus, the WRAM reduced the asymmetric risk instituted by the rate design and  
1135 allowed the continuation of the same risk as before the inverted rate design. If the WRAM  
1136 is now eliminated and the rate design and conservation efforts taken out of the true-up, then  
1137 California American Water will be exposed to a permanent asymmetric risk.

1138 As discussed in the testimony of Jeffrey T. Linam at Section VIII and detailed in the report  
1139 of M. Cubed attached as Attachment A to the Linam Testimony, the distribution of California  
1140 American Water's sales are skewed towards lower than average sales. The asymmetry in  
1141 sales disproportionately affects capital intensive industries such as the water industry as fixed  
1142 costs do not change with volume and a large fraction of the fixed costs are recovered from  
1143 volume charges. Thus, the downward skewed sales (as demonstrated in the report of M.  
1144 Cubed) puts recovery of all costs (including the cost of capital) at risk. The original adoption  
1145 of the WRAM intended to address this issue and ending the WRAM will bring back the  
1146 asymmetric sales risk.

1147 **Q82. How does the risk factors discussed above compare to those of the sample companies?**

1148 A82. California American Water's business risks are unique for several reasons. First, California  
1149 American Water is capital intensive and has comparable to higher capital expenditure than  
1150 the sample. Second, California American Water has been unable to earn its allowed ROE  
1151 indicating the presence of asymmetric risks. Third and very importantly, California  
1152 American Water face financial circumstances that imply they do not earn a return on all  
1153 assets and specifically face a higher degree of leverage than indicated in their capital  
1154 structure. Fourth, the continual drought situation in California means that California  
1155 American Water is exposed to a continual downward pressure on consumption with little to  
1156 no upside. The removal of the WRAM therefore will expose California American Water to  
1157 a downward biased revenue recovery and hence an asymmetric recovery of the revenue  
1158 requirement. All of these risk factors point to a higher than average ROE and a non-trivially  
1159 higher ROE.

1160

1161 **VII. EXPECTED COST OF DEBT**

1162 **Q83. What do you cover in this section?**

1163 A83. California American Water has asked me to address the plausible developments in the cost  
1164 of debt that the Company will face going forward as it refinances part of its debt and raise  
1165 new debt. Consequently, I look to available forecasts for interest rates, recently raised debt  
1166 by water utilities, and the spread between various types of debt to assess a reasonable range  
1167 for the cost of debt going forward. I focus on yields in this section as interest rates have two  
1168 components: the interest stated on the issued bond and the price at which the bond is issued  
1169 and subsequently trade. The yield captures both components.

1170 **Q84. What does interest rate forecasts look like?**

1171 A84. As discussed in Section IV, interest rates are expected to increase going forward, so that the  
1172 yield on a 10-year government bond is expected to increase from about 1.50% in 2021 to  
1173 2.90% in 2027. As bonds with a longer maturity require a maturity premium, 20-year and

1174 30-year government bonds are expected to have higher yields. The long-term average  
1175 maturity premium on a 20-year government bond is about 50 basis points.<sup>88</sup>

1176 **Q85. How do utilities' bond yields relate to government bond yields?**

1177 A85. There is typically a spread between utility bond yields and government bonds yields that  
1178 capture the fact that utility bonds are not risk-free. This spread depends on the characteristics  
1179 of the utility issuing the bonds; for example, the credit rating of the utility and the specific  
1180 bond issue, so I the yield spread (the difference between the yield on a utility bond and a  
1181 government bond of the same maturity) is higher for BBB rated utility than for A rated  
1182 entities. American Water Works has a split rating with an A rating from S&P and Baa1  
1183 rating for Moody's.<sup>89</sup> Consequently, I expect California American Water's cost of debt to  
1184 reflect that split rating.

1185 **Q86. Please explain how you determined a reasonable range for the cost of debt going**  
1186 **forward.**

1187 A86. I undertook the following calculations. I obtained available forecasts on the expected yield  
1188 on government bonds from Blue chip economic indicators. Next, I calculated the spread  
1189 between the yield on A-rate utility bonds and the yield on 10-year government bonds using  
1190 data for 2021. I similarly calculated the spread between the yield on BBB-rated utility bonds  
1191 and the yield on 10-year government bonds using data for 2021. I did this for maturities of  
1192 10-, 20-, and 30-year utility bonds. The forecasted 10-year government bond yield plus the  
1193 spread to A and BBB rated utility bond yields constitute a lower bound on the expected yield  
1194 on utility bonds with an A and BBB rating.

1195 To consider water utility and especially California American Water specific issues, I pulled  
1196 data from CapIQ on recent bond issuances by water companies and found only two:  
1197 American Water Works on 4/14/2020 and Essential Utilities on 4/15/2020. The yield on  
1198 American Water Works' bonds was 53 basis points above the average A rated utility bond

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<sup>88</sup> See, for example, Exhibit BV-3.

<sup>89</sup> Standard & Poor's, "American Water Works Company, Inc.," December 11, 2020 and Moody's, "American Water Works Company, Inc.," April 30, 2020.

1199 yield, while that of Essential Utilities was 42 basis points above. Thus, these bond issuances  
 1200 were issued at a yield premium. I rely on a declining spread to the generic yield to determine  
 1201 a Company-specific or realistic upper bound on the yield on California American Water-  
 1202 related bonds going forward. I consider the use of only a fraction of the actual spread  
 1203 conservative.

1204 **Q87. What are the results of your calculations?**

1205 A87. My results are shown in Figure 20 below.

**Figure 20**  
 Expected Yield on Utility Bond Issuances

	2021	2022	2023	2024	2025	2026	2027
Expected Yield on 10-Year Treasury Bond	1.50%	1.90%	2.30%	2.50%	2.70%	2.80%	2.90%
Generic 30-Years A-rated Utility bond - Company-specific 30-year BBB-Rated (declining Company premium)	3.54%	3.94%	4.34%	4.54%	4.74%	4.84%	4.94%
Generic 30-Years BBB-rated utility bond Company-specific 30-year A-Rated (declining Company premium)	<b>3.96%</b>	<b>4.26%</b>	<b>4.55%</b>	<b>4.65%</b>	<b>4.85%</b>	<b>4.95%</b>	<b>5.05%</b>
Average Yield of A and BBB Average Yield on A and BBB using declining Company premium	3.90%	4.30%	4.70%	4.90%	5.10%	5.20%	5.30%
	<b>4.32%</b>	<b>4.62%</b>	<b>4.91%</b>	<b>5.01%</b>	<b>5.21%</b>	<b>5.31%</b>	<b>5.41%</b>
	3.72%	4.12%	4.52%	4.72%	4.92%	5.02%	5.12%
	<b>4.14%</b>	<b>4.44%</b>	<b>4.73%</b>	<b>4.83%</b>	<b>5.03%</b>	<b>5.13%</b>	<b>5.23%</b>

1206 Source: Exhibit BV-4.

1207 I note that American Water Works (as well as Essential Utilities) in 2020 issued bond with  
 1208 a yield premium of 53 and 42 basis points relative to the generic utility A rated bond yield.  
 1209 As the difference between A and BBB rated utility bond yields is lower than that, it is very  
 1210 possible that California American Water will see its cost of debt higher than those expected  
 1211 for the utility industry. Also, given the split rating I believe the average is more reflective  
 1212 than either rating.

1213 **VIII. RECOMMENDED ALLOWED ROE FOR CALIFORNIA-AMERICAN WATER**

1214 **Q88. Please summarize your ROE evidence.**

1215 A88. Based on my application of standard cost of capital models to a representative sample (and  
 1216 sub-sample) of publicly-traded water utility companies—with appropriate adjustments for

1217 differences in financial leverage I derived the range of cost of equity estimates of 9¾ to 11  
1218 percent as displayed in Figure 21 below.

**Figure 21: Reasonable Range of ROE Estimates for Water Utilities**

	Reasonable Range
CAPM / ECAPM	9.75% - 11%
DCF	10%
Risk Premium	At least 9.7%
Overall Range	9.75% - 11%

1219 Based on my assessment of the merits of the various models and their results as affected by  
1220 prevailing economic and capital market conditions, I find that an ROE in the range of 9¾ to  
1221 10¾ percent is reasonable for 2022-2024 for the water distribution utilities when applied to  
1222 capital structure with approximately 55 percent equity. I further note that the primary  
1223 methods relied upon, such as the CAPM and DCF, are similar to those used in California-  
1224 American Water’s previous ratemaking proceedings.

1225 **Q89. What do you recommend for California-American Water’s allowed return on equity?**

1226 A89. Based on the business risk analysis above and especially the asymmetric nature of many of  
1227 California American Water’s risks I recommend the California American Water be placed at  
1228 or near the upper end of the reasonable range and recommend a ROE of 10¾ percent. That  
1229 figure is at the high end of my recommended range of 9¾ to 10¾ percent for the cost of  
1230 equity of a typical sample water utility with California-American Water’s financial leverage.  
1231 My determination that the Company should earn an ROE at the high end—rather than at the  
1232 midpoint of that range is based on my conclusion that California-American Water (i) has  
1233 higher operating leverage than the sample, (ii) has been unable to earn its allowed ROE, (iii)  
1234 faces some unique asymmetric risks such as being unable to earn its weighted cost of capital  
1235 on regulatory assets, increasing delay in recovery of cost, and (iii) has a unique asymmetric  
1236 exposure to variations in sales, which will be exacerbated by the elimination of the WRAM  
1237 during the period. Additionally, California water utilities face unique supply risks due to  
1238 ongoing droughts. Consequently, I find an ROE that is at the top of my reasonable range for  
1239 a generic water utility and 30-35 bps above the midpoint reasonable.

1240 **Q90. Does your recommendation include any consideration for recovery of flotation costs**  
1241 **associated with California-American Water's equity issuances?**

1242 A90. No, it does not. While it is appropriate that California-American be allowed to recover  
1243 underwriting fees and any other costs associated with its equity issuances as part of its cost  
1244 of service, neither my cost of equity estimates for the water utility sample nor my  
1245 recommended allowed ROE for California-American Water includes any adjustment for  
1246 such flotation costs. In my experience, it is not uncommon for regulators to provide an  
1247 upward adjustment to the allowed ROE in 10 to 50 basis points range to provide for the  
1248 recovery of flotation costs.

1249 **Q91. Does this conclude your direct testimony?**

1250 A91. Yes.