

July 12, 2022

Mr. Douglas Anderson, Executive Director Public Employees Retirement Association of Minnesota 60 Empire Drive, Suite 200 St. Paul, MN 55103

### Re: 2022 Valuation Interest Rate Assumption

Dear Doug:

We are pleased to present our review of the long-term rate of investment return and inflation assumptions for the Public Employees Retirement Association (PERA). The purpose of this report is to comply with Actuarial Standards of Practice and to assist PERA in the selection of appropriate assumptions for funding purposes and Governmental Accounting Standards Board (GASB) Statements Nos. 67 and 68 reporting. This report should not be relied upon for any purpose other than the purpose described herein.

### **Background**

In a 2021 analysis of long-term rate of investment return and inflation assumptions, Gabriel, Roeder, Smith & Company (GRS) suggested that an investment return assumption in the range of 5.71% to 7.00% would be reasonable. This report also concluded that the probability of exceeding a 7.5% assumption over 10 years was only 34%. Please see our letter, *2021 Valuation Interest Rate*, dated June 24, 2021 for additional information.

In particular, our 2021 report contained the following statement: "We recommend that PERA consider an investment return assumption in the range of 5.71% to 6.61%. Based on the data reviewed, we can support a 7.0% discount rate for the 2021 valuation, but PERA should note that the selection of an investment return assumption near the upper end of this range may not be sustainable. A rate near the bottom of the range, such as 5.75%, would be more likely to be sustainable for a longer period. If in a future year the assumption is deemed unreasonable, we would need to qualify our report and we would not be able to use the assumption in the GASB calculations."

The assumed rate for the 2021 valuation report, which is mandated by Minnesota Statutes, was 7.5%. GRS still complied with statutes and produced the 2021 valuation report based on 7.5%, but Actuarial Standards required us to include a statement indicating that "the prescribed assumption significantly conflicts with what, in our professional judgment, would be reasonable."

On the following pages, we present information that leads us to conclude that the statutory rate of 7.5% continues to be outside of a reasonable range as of July 1, 2022.

The assumed rate for the GASB report, which is selected by PERA, was changed from 7.5% to 6.5% effective with the 2021 report. The 6.5% assumption for GASB purposes continues to be within a reasonable range.

# **Actuarial Standards of Practice**

The relevant Actuarial Standard of Practice (ASOP) for economic assumptions is ASOP No. 27, Selection of Economic Assumptions for Measuring Pension Obligations. Under ASOP No. 27, Section 3.6, an economic assumption is reasonable if it has the following characteristics:

- It is appropriate for the purpose of the measurement;
- It reflects the actuary's professional judgment;
- It takes into account current and historical data that is relevant to selecting the assumption for the measurement date, to the extent such relevant data is reasonably available;
- It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data (if any), or a combination thereof; and
- It is expected to have no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included (as discussed in Section 3.5.1) or when alternative assumptions are used for the assessment of risk, in accordance with ASOP No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions.

## **Inflation**

The long-term inflation assumption is a building block for the remaining economic assumptions. The PERA Trustees and the Legislative Commission on Pensions and Retirement (LCPR) approved a change in the inflation assumption, from 2.50% to 2.25%, effective for the actuarial valuations as of July 1, 2020.

We examined the capital market assumption sets for twelve investment consulting firms from the GRS 2022 Capital Market Assumption Modeler (CMAM). The average assumption for inflation was 2.53%, with a range of 2.26% to 3.10%. Current inflation expectations are higher than expectations from one year ago, when the average assumption for inflation was 2.19%, with a range of 1.92% to 3.10%.

The 2022 Social Security Trustees report uses 2.4% as the long-range intermediate price inflation assumption. The low-cost assumption is 3.0%, and the high-cost assumption is 1.8%. (The Social Security program benefits from high inflation through faster earnings and revenue growth.)

The following chart from the Federal Reserve Bank of St. Louis shows a 5-year history of the 10-year breakeven inflation rate. The breakeven inflation rate represents a measure of expected inflation derived from 10-Year Treasury Constant Maturity Securities and 10-Year Treasury Inflation-Indexed Constant Maturity Securities. The latest value implies what market participants expect inflation to be in the next 10 years, on average. The chart shows an upward trend over the last 2 years, peaking at approximately 3.02% on April 21, 2022, and declining to 2.29% on July 6, 2022.





Based on the data presented, GRS believes the 2.25% inflation assumption is within the reasonable range for valuations as of July 1, 2022.

The data presented above suggests that an inflation assumption of 2.50% may also be within the reasonable range. In this letter, we develop a reasonable range for the investment return assumption based on the **current** inflation assumption of 2.25%. An increase in assumed inflation could lead to an equal increase in the expected nominal return (as long as the inflation assumption does not differ too much from the average assumption of the investment firms in the model). Keep in mind that the inflation assumption also impacts other economic assumptions, including payroll growth, salary scale, and post-retirement benefit increases payable to retirees, which are outside the scope of this report.

## Long-Term Rate of Return on Investments

For purposes of budgeting contributions and measuring liabilities for public employee retirement systems, the assumed rate of investment return is used as the discount rate to determine the present value of a system's pension obligations. For most valuations, an actuarial investment return assumption based on expected future experience is a single estimate for all years and, therefore, implicitly assumes that returns above and below expectations will average out over time. In other words, the expected risk premium is reflected in the assumed rate of investment return in advance of being earned, while the investment risk (i.e., volatility) is not reflected until actual experience emerges with each valuation.

The analysis of the investment return assumption in this report is based on forward-looking measures of expected investment return outcomes for the asset classes in the System's current investment policy. For purposes of this analysis, we have analyzed the System's investment policy with the capital market assumptions from twelve nationally recognized investment firms.



Our analysis is based on the GRS 2022 Capital Market Assumption Modeler (CMAM<sup>1</sup>). The purpose of the CMAM is to assess the reasonability of the assumed rate of return for use in the actuarial valuations for the plan. In our professional judgment the CMAM has the capability to provide results that are consistent with this purpose. A description of the strengths, limitations and weaknesses of the model are incorporated in this report. In our opinion, the limitations and weaknesses are not material. We performed tests to ensure that the model reasonably represents that which is intended to be modeled. We are relying on the GRS actuaries and Internal Software, Training, and Processes Team who developed and maintain the model.

Because GRS is a benefits consulting firm and does not develop or maintain its own capital market expectations, we request and monitor forward-looking expectations developed by several major investment firms. We update our CMAM on an annual basis. The capital market assumptions in the 2022 CMAM are from the following investment firms (in alphabetical order): Aon Hewitt, Blackrock, BNY Mellon, Callan, Cambridge, JPMorgan, Meketa, Mercer, NEPC, RVK, Verus, and Wilshire. We believe that the benefit of performing this analysis using multiple investment firms is to recognize the uncertain nature of the items affecting the selection of the investment return assumption. While there may be differences in asset classes, investment horizons, inflation assumptions, treatment of investment expenses, excess manager performance (i.e., alpha), etc., we have attempted to align the various assumption sets from the different investment firms to be as consistent as possible. In some cases, we have made minor adjustments or assumptions to align the various assumptions sets with our model.

Each investment firm provided capital market assumptions over an investment horizon of approximately 10 years. Although investment firms often refer to this period as "short-term" it is important to remember that 10 years is actually a very long time. In fact, the duration of the liabilities of the General Employee Retirement Plan is 11 years. Therefore, returns during the next 10 years will affect the plans funding materially. (The duration of the present value of future benefits may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the present value of future benefits would increase approximately 10% if the assumed rate of return were lowered 1%.) A subset of six investment firms provided capital market expectations over a longer horizon, varying between 20 and 30 years. For purposes of this report, the analysis is generally based on the 10-year expectations provided by the investment firms.

In general, our understanding is that the methodology for developing these capital market expectations is forward-looking, not purely backward-looking. Over the years, we have observed a general decreasing trend in capital market expectations. However, we have also observed that some of the investment firms' assumption sets are dependent on the market conditions at the time they are developed and consequently may be sensitive to short-term market fluctuations. Some expectations are contrarian – meaning that when the market is high, future expectations are lowered and when the market is low, future expectations are raised. The amount of these fluctuations as they appear in the year-to-year capital market assumptions varies between the various investment firms.

Each year, the GRS CMAM reflects the most up-to-date information at the time the data was collected (typically reflecting the firms' expectations at the beginning of the calendar year). Compared to the 2021 survey, the 2022 survey generally shows slightly higher return expectations for the fixed income asset

<sup>&</sup>lt;sup>1</sup> Issued 2022-06-09.



classes and some modest decline in the forward-looking return expectations for domestic public equity. This is perhaps due in part to the increase in bond yields during the 2021 calendar year from record lows and a strong U.S. stock market performance at the end of 2021. Generally, the forward-looking returns in the 2022 survey are also considerably lower than the return expectations in the 2020 survey. If we consider the three-year average of return expectations, the general decreasing trend continues and the short-term fluctuations are diminished. The chart below illustrates the volatility from year to year from past CMAMs with a generic 65/35 asset allocation. The general declining trend is illustrated with the three-year average of CMAM returns.



To the best of our ability, we have adapted the System's investment policy to fit with the investment firms' assumptions adjusting for these known differences in assumptions and methodology. The asset classes in the system's investment allocation often do not exactly align with the asset classes of all investment firms in the survey. This may require us to make approximations which can introduce some subjectivity into the process. In the following charts, to the extent possible all returns are net of passive investment expenses and have no assumption for excess manager performance (alpha) in excess of active management fees.



For purposes of this analysis, we have reviewed the following asset mix based on the Minnesota State Board of Investment (SBI) Combined Funds Policy Target in the SBI's Performance Report as of March 31, 2022:

Asset Class	Asset Allocation		
Public Equity	50%		
Fixed Income	25		
Private Markets	25		

Additionally, the following background information was provided by the SBI regarding the actual asset allocation as of March 31, 2021. SBI staff provided assurances that no significant changes in asset allocation are expected and that these are appropriate to use going forward.

	Asset
Asset Class	Allocation
Domestic Equity	33.9%
International Equity	15.0%
Global Equity	1.0%
Core/Core Plus Fixed Income	5.0%
Return Seeking Fixed Income	4.3%
Treasury Protection	9.2%
Laddered Bond plus Cash	5.8%
Real Estate	1.8%
Private Equity	16.1%
Private Credit	1.8%
Real Assets	2.2%
Large Cap Stocks (uninvested	3.9%
private market allocation)	



The arithmetic expected return developed from this detailed actual asset allocation is shown in the table below. The CMAM begins with the nominal expected return from each Capital Market Assumption (CMA) set (column 2), takes out each CMA's price inflation assumption (column 3) to arrive at the real return (column 4). We then incorporate the current price inflation assumption of 2.25% (column 5) to get the adjusted nominal return (column 6). Investment expenses not already netted out of the return and/or administrative expenses paid out of trust assets which are not reflected in the employer contributions (column 7) are netted out of the return. The final arithmetic expected return is shown in column 8. We believe that this is reasonable provided that the current price inflation assumption does not differ materially from the assumptions used by the investment firms. Note that the arithmetic return is in general higher than the median return due to the compounding effect of random returns. In general, the difference between the arithmetic and median return will be larger for larger standard deviation of returns. We have shown the standard deviation of returns as the investment risk in column 9. The average arithmetic return and standard deviation from the last three years of CMAMs are shown at the bottom of the table for reference.

ASOP No. 27, Section 3.6.2, states that "[d]ue to the uncertain nature of the items for which assumptions are selected, the actuary may consider several different assumptions reasonable for a given measurement. Different actuaries will apply different professional judgment and may choose different reasonable assumptions. As a result, a range of reasonable assumptions may develop, both for an individual actuary and across actuarial practice." This range of different expectations from the CMAs is evident from the summaries we show from our CMAM.

GRS 2022 CMAM								
Capital Market Assumption Set (CMA)	CMA Expected Nominal Return	CMA Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Plan Incurred Administrative Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	6.36%	3.00%	3.36%	2.25%	5.61%	0.00%	5.61%	13.40%
2	6.24%	2.60%	3.64%	2.25%	5.89%	0.00%	5.89%	14.04%
3	6.17%	2.40%	3.77%	2.25%	6.02%	0.00%	6.02%	14.00%
4	6.15%	2.50%	3.65%	2.25%	5.90%	0.00%	5.90%	13.04%
5	6.04%	2.31%	3.73%	2.25%	5.98%	0.00%	5.98%	12.52%
6	6.36%	2.31%	4.05%	2.25%	6.30%	0.00%	6.30%	14.39%
7	6.91%	2.64%	4.27%	2.25%	6.52%	0.00%	6.52%	14.94%
8	6.83%	2.50%	4.33%	2.25%	6.58%	0.00%	6.58%	14.14%
9	6.89%	2.41%	4.49%	2.25%	6.74%	0.00%	6.74%	14.05%
10	7.05%	2.26%	4.79%	2.25%	7.04%	0.00%	7.04%	14.64%
11	7.54%	2.29%	5.25%	2.25%	7.50%	0.00%	7.50%	13.32%
12	9.34%	3.10%	6.24%	2.25%	8.49%	0.00%	8.49%	15.18%
Average	6.82%	2.53%	4.30%	2.25%	6.55%	0.00%	6.55%	13.97%
			Average from	m last 3 CMAMs	6.84%	13.84%		



The average expected nominal return from column 8 is 6.55%. This is the return that is "expected' each year. However, the average volatility of return, the standard deviation, is 13.97%. Volatility drags down the cumulative return over time -- losses hurt more than gains help. Although the expected return, in this case 6.55%, can be considered a reasonable assumption, we prefer the median return (see page 10) over time, because it adjusts the cumulative expectation for volatility.

Next, we compare the probabilities of achieving returns over a 10-year horizon. We compute the 40th, 50th, and 60th percentiles of returns as well as the probability of achieving the current assumptions of 7.50% (for funding purposes), and 6.50% (for GASB purposes) over a 10-year horizon. These estimates are based on the assumption that the distribution of returns for the next 10 years is the same each year. The average median return from the last three years of CMAMs is shown at the bottom of the table for reference.

GRS 2022 CMAM							
Capital Market Assumption	Distribution o Ne	f 10-Year Avera et Nominal Retu	Probability of exceeding	Probability of exceeding			
Set (CMA)	40th	50th	60th	7.50%	6.50%		
(1)	(2)	(3)	(4)	(5)	(6)		
1	3.72%	4.77%	5.84%	26.01%	34.12%		
2	3.86%	4.97%	6.08%	28.39%	36.42%		
3	4.01%	5.11%	6.22%	29.42%	37.59%		
4	4.08%	5.11%	6.15%	28.10%	36.73%		
5	4.26%	5.25%	6.25%	28.52%	37.59%		
6	4.21%	5.34%	6.48%	31.69%	39.86%		
7	4.32%	5.49%	6.68%	33.44%	41.45%		
8	4.54%	5.65%	6.78%	33.91%	42.42%		
9	4.72%	5.83%	6.94%	35.24%	43.91%		
10	4.90%	6.05%	7.21%	37.62%	46.08%		
11	5.63%	6.68%	7.74%	42.25%	51.76%		
12	6.25%	7.45%	8.65%	49.54%	57.96%		
Average	4.54%	5.64%	6.75%	33.68%	42.16%		
Average from last 3 CMAMs		5.95%					

The 50th percentile return is also related to the geometric average return. The geometric average of a sequence of returns over a number of years is the compound average of those returns over the number of years compounded. As the number of years in the geometric average increase and if the distributions of returns each year are independent and identically distributed, then the geometric average will converge to the median return. The median return may be considered a reasonable rate of return for purposes of the valuation. The average of 50th percentile returns is 5.64% per year.



Column 5 of table 2 shows the estimated probability of achieving the 7.50% assumed rate of return over a 10-year period. The average probability of achieving 7.50% over 10 years is 34%. Column 6 of the table shows the estimated probability of achieving the 6.5% assumed rate of return used for GASB purposes over a 10-year period. The average probability of achieving 6.5% over 10 years is 42%.

In summary, a reasonable range for the assumed rate of return based solely on the current CMAM's 10-year investment horizon and the current inflation assumption of 2.25% is between the median of 5.64% and the (arithmetic) nominal expected return of 6.55%. Returns outside that range are not necessarily unreasonable, but a separate justification may be needed.

Our preferred return assumption based upon our most current CMAM and 10-year expectations is 5.64%. We recognize that capital market assumptions are volatile, and because of that we can consider the average of recent CMAMs. If we look at the three-year average arithmetic expectation, an assumed return of up to 6.84% can be justified.

For reference, based on the longer horizon (20 to 30 years) CMAs that were provided by some investment firms, the median expected return for a 20-year period is 6.72%.

If the assumed rate of return is changed from 7.50% to 6.75%, the probability of achieving the assumed rate of return over a 10-year period improves from 34% to 40%.

Nothing in this report should be construed as GRS giving investment advice.

## **Comments and Recommendations**

Capital market assumptions have declined significantly since the most recent PERA General Plan experience study. Although the statutory rate of 7.5% appeared reasonable based on the information available in 2019, based on the analysis in our 2021 letter GRS determined that the 7.5% statutory rate was outside the reasonable range for PERA valuations as of July 1, 2021. Further, based on the analysis in this letter, **GRS continues to believe that the 7.5% statutory rate is outside of the reasonable range for PERA valuations as of July 1, 2021**. Further, based on the analysis in this letter, **GRS continues to believe that the 7.5% statutory rate is outside of the reasonable range for PERA valuations as of July 1, 2022**. We will, of course, comply with statutes and produce the valuation based upon 7.5%, but Actuarial Standards will require us to include a statement indicating that "the prescribed assumption significantly conflicts with what, in our professional judgment, would be reasonable."

For GASB work, GRS believes that the current 6.5% assumed interest rate remains reasonable based upon actuarial standards of practice.

We recommend that PERA consider an investment return assumption in the range of 5.64% to 6.55%. Based on the data reviewed, we can support a discount rate up to 6.84% for the 2022 valuation. PERA should note that the selection of an investment return assumption near the upper end of this range may not be sustainable. A rate near the bottom of the range, such as 5.75%, would be more likely to be sustainable for a longer period.



If an inflation assumption of 2.50% is used instead of the current assumption of 2.25%, the range above would increase by 0.25%, to 5.89% to 6.80% (as long as the inflation assumption does not differ too much from the average assumption of the investment firms in the model). Keep in mind that the inflation assumption also impacts other economic assumptions, including payroll growth, salary scale, and postretirement benefit increases payable to retirees, which are outside the scope of this report.

GRS acknowledges that PERA unsuccessfully sought legislation to reduce the investment return assumption during the 2022 legislative session; while we would prefer a lower assumption than the 7.0% that was in the proposed pension bill, we view this change as a positive step to get closer to the reasonable range.

Our valuation reports are required to demonstrate the sensitivity of the discount rate assumption by providing key metrics using a discount rate 1% higher and 1% lower than the prescribed rate. We will comment in the reports that the 6.5% discount rate is within a reasonable range, and that the 7.5% and 8.5% discount rates are outside of the reasonable range.

Brian B. Murphy and Bonita J. Wurst are independent of the plan sponsor and are Members of the American Academy of Actuaries who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. In addition, Mr. Murphy meets the requirements of "approved actuary" under Minnesota Statutes 356.215, Subdivision 1, Paragraph (c).

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge and belief, the information contained in this report was performed in accordance with the requirements of Minnesota Statutes 356.215, and the requirements of the Standards of Actuarial Work established by the Legislative Commission on Pensions and Retirements. All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

Respectfully submitted,

Bonito J. Wurst

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