



CAPITAL MARKET ASSUMPTIONS FOLLOW UP

EMPLOYEES' RETIREMENT SYSTEM
OF THE STATE OF RHODE ISLAND

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CAPITAL MARKET ASSUMPTIONS OVERVIEW

- **At the March SIC meeting, there was a request to utilize the average return assumptions from NEPC, Cliffwater and Meketa for the 2023 Asset/Liability study.**
- **The following slides shows the proposed arithmetic and geometric return forecasts by asset class and across the functional buckets.**
- **NEPC risk forecasts will be used for purposes of the study and for purposes of converting arithmetic return forecasts to geometric return forecasts. An example of the conversion process is shown in the appendix.**
- **We have also included a draft asset/liability study timeline in the materials.**

ERSRI PROPOSED ASSET CLASS ASSUMPTIONS

		Current Target
Growth	Global Equity	40.0%
	Private Equity	12.5%
	Non-Core Real Estate	2.5%
	Private Growth	15.0%
	TOTAL GROWTH	55.0%

Income	Equity Options	2.0%
	Liquid Credit	3.0%
	EMD (Blended)	2.0%
	CLO Mezz/Equity	2.0%
	Private Credit	3.0%
	TOTAL INCOME	12.0%

Stability	Long Treasuries	5.0%
	Systematic Trend	5.0%
	CPC	10.0%
	Core Real Estate	4.0%
	Private Real Assets (ex-Real Estate)	4.0%
	Inflation Protection	8.0%
	Inv. Grade Fixed (ex-Treasuries)	6.5%
	Absolute Return	6.5%
	Strategic Cash	2.0%
	Volatility Protection	15.0%
TOTAL STABILITY	33.0%	

TOTAL PORTFOLIO	100.0%
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10-Year Arithmetic Returns			
NEPC	Meketa	Cliffwater	Average
7.7%	10.1%	8.8%	8.9%
11.8%	12.5%	12.3%	12.2%
6.7%	8.1%	12.5%	9.1%
10.9%	11.8%	12.3%	11.7%
8.3%	10.6%	9.9%	9.6%

6.5%	7.4%	5.0%	6.3%
7.7%	8.5%	7.5%	7.9%
7.9%	7.1%	7.1%	7.4%
6.1%	8.7%	7.1%	7.3%
9.4%	10.3%	9.6%	9.8%
7.7%	8.6%	7.5%	7.9%

4.6%	4.9%	4.2%	4.6%
6.2%	5.3%	4.1%	5.2%
5.4%	5.1%	4.2%	4.9%
5.0%	4.9%	7.1%	5.7%
7.2%	7.8%	8.0%	7.7%
6.1%	6.4%	7.6%	6.7%
5.8%	5.3%	5.6%	5.6%
6.9%	5.6%	5.3%	5.9%
4.0%	3.1%	2.5%	3.2%
6.0%	5.1%	5.0%	5.4%
5.8%	5.4%	5.4%	5.5%

7.4%	8.6%	8.1%	8.1%
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10-Year Geometric Return*	NEPC Expected Risk
7.5%	18.1%
9.6%	25.7%
7.7%	18.5%
9.5%	23.4%
8.2%	18.9%

5.8%	11.1%
7.5%	9.5%
6.7%	12.6%
7.1%	7.6%
9.2%	11.8%
7.5%	9.3%

4.0%	11.8%
4.8%	9.3%
4.6%	7.8%
4.7%	15.0%
7.0%	12.4%
6.1%	11.8%
5.3%	7.7%
5.6%	8.6%
3.2%	0.6%
5.2%	6.1%
5.4%	6.5%

7.4%	12.9%
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*10-Year Geometric Returns based on Average Arithmetic Return and NEPC Expected Risk.



FUNCTIONAL BUCKET COMPARISON

			2023		2019	
			Functional Buckets		Functional Buckets	
			Expected Return	Expected Risk	Expected Return	Expected Risk
Growth		Current Target				
	Global Equity	40.0%	8.2%	18.9%	8.2%	20.4%
	Private Equity	12.5%				
	Non-Core Real Estate	2.5%				
	Private Growth	15.0%				
TOTAL GROWTH	55.0%					
Income	Equity Options	2.0%	7.5%	9.3%	7.4%	13.7%
	Liquid Credit	3.0%				
	EMD (Blended)	2.0%				
	CLO Mezz/Equity	2.0%				
	Private Credit	3.0%				
TOTAL INCOME	12.0%					
Stability	Long Treasuries	5.0%	5.4%	6.5%	4.4%	8.5%
	Systematic Trend	5.0%				
	CPC	10.0%				
	Core Real Estate	4.0%				
	Private Real Assets (ex-Real Estate)	4.0%				
	Inflation Protection	8.0%				
	Inv. Grade Fixed (ex-Treasuries)	6.5%				
	Absolute Return	6.5%				
	Strategic Cash	2.0%				
	Volatility Protection	15.0%				
TOTAL STABILITY	33.0%					

Expected returns are geometric. See prior page for description of 2023 assumptions.
 2019 assumptions based on NEPC's 5-7 year return forecasts from the 2019 Asset/Liability study.



DRAFT ASSET/LIABILITY STUDY TIMELINE

- We anticipate the full asset/liability study will take 4 to 5 months to complete.
- The schedule below provides a high-level overview of the steps involved and the estimated timing to complete each step.

Step/Milestone	Timing
Asset/Liability Study Kickoff Discussion	February – COMPLETE
NEPC Coordinates with Plan Actuary on Data Needs	February – COMPLETE
Preliminary Capital Market Assumption Discussion	March – COMPLETE
Finalize Capital Market Assumptions	April – Today’s Discussion
NEPC Receives Actuarial Forecasts and Prepares Baseline Forecast Results	May
Discuss Baseline Results and Potential Alternative Portfolios	June SIC Meeting
NEPC Prepares Analysis of Alternative Portfolios	June/July
Discuss Alternative Portfolios and Preliminary Findings	July SIC Meeting
NEPC and State of RI Staff Prepare Recommendation	August
Final Recommendation Delivered to SIC	September SIC Meeting
Portfolio Implementation Discussion	Post-A/L Study



Note: Timing is estimated and subject to change.



APPENDIX



ARITHMETIC TO GEOMETRIC RETURN CONVERSION

- There are several methodologies used to convert arithmetic return forecasts to geometric return forecasts.
- A common approach is to subtract half of the asset class variance from the arithmetic return.
- Consider the following example of an asset class with a 5% arithmetic return and a 10% standard deviation.

Arithmetic Return [A]	Standard Deviation [B]	Variance [C]	Half the Variance	Geometric Return
		= B ²	= C x 50%	= A - D
5.00%	10.00%	1.00%	0.50%	4.50%

- NEPC utilizes a slightly more complex approach which considers higher order moments such as skew and kurtosis beyond just variance and standard deviation. This approach produces similar results as shown above.

CONSULTANT RETURN FORECAST COMPARISON

AS OF DECEMBER 31, 2022

	NEPC	Meketa	Cliffwater	Average	Range (Low - High)	
Global Equity (ACWI)	6.3%	8.8%	7.3%	7.5%	6.3%	8.8%
U.S. Large Cap Equities	5.4%	7.8%	7.3%	6.8%	5.4%	7.8%
Global Ex-U.S. Large Cap Eq.	5.6%	10.1%	7.3%	7.7%	5.6%	10.1%
Emerging Large Cap Equities	9.6%	10.3%	7.3%	9.1%	7.3%	10.3%
China-Broad Market Equities	8.7%	8.8%	N/A	8.7%	8.7%	8.7%
Fixed Income						
U.S. Cash	4.0%	3.1%	2.3%	3.1%	2.3%	4.0%
U.S. Aggregate Bonds	4.8%	4.8%	4.7%	4.8%	4.7%	4.8%
U.S. TIPS	4.4%	4.3%	3.9%	4.2%	3.9%	4.4%
U.S. Credit (All Maturities)	5.9%	N/A	5.4%	5.6%	5.4%	5.9%
U.S. Government (10+ Years)	4.0%	4.3%	3.9%	4.1%	3.9%	4.3%
Alternatives						
U.S. Bank Loans	7.8%	7.6%	6.2%	7.2%	6.2%	7.8%
U.S. High Yield	7.1%	8.0%	6.9%	7.3%	6.9%	8.0%
USD EM Debt	7.1%	N/A	6.8%	7.0%	6.8%	7.1%
Local Currency EM Debt	7.2%	6.4%	N/A	6.8%	6.4%	7.2%
Other						
Hedge Funds (Global)	6.5%	5.4%	5.2%	5.7%	5.2%	6.5%
U.S. Private Equity (Buyout)	7.7%	9.7%	10.3%	9.2%	7.7%	10.3%
Commodities	4.2%	6.3%	2.5%	4.3%	2.5%	6.3%



Return forecasts sourced directly from each provider. Based on 10-year geometric return forecasts, where available.

ASSET MANAGER 10-YEAR RETURN FORECASTS

AS OF DECEMBER 31, 2022

	NEPC	BlackRock	Research Affiliates	Invesco	BNY Mellon	VOYA	Average	Average ex. NEPC	Range (Low - High)	
Global Equity (ACWI)	6.3%	n/a	7.1%	7.9%	6.9%	4.8%	6.6%	6.7%	4.8%	7.9%
U.S. Large Cap Equities	5.4%	7.9%	5.2%	7.7%	6.4%	4.8%	6.2%	6.4%	4.8%	7.9%
U.S. Small Cap Equities	6.5%	5.6%	8.3%	10.0%	7.1%	4.2%	7.0%	7.0%	4.2%	10.0%
Global Ex-U.S. Large Cap Eq.	5.6%	10.3%	10.3%	8.2%	6.9%	3.6%	7.5%	7.9%	3.6%	10.3%
Emerging Large Cap Equities	9.6%	11.0%	11.3%	9.7%	9.3%	3.8%	9.1%	9.0%	3.8%	11.3%
China-Broad Market Equities	8.7%	10.6%	10.8%	9.3%	n/a	n/a	9.8%	10.2%	8.7%	10.8%
Fixed Income										
U.S. Cash	4.0%	3.4%	2.5%	n/a	2.3%	2.3%	2.9%	2.6%	2.3%	4.0%
U.S. Aggregate Bonds	4.8%	4.2%	4.4%	4.4%	4.1%	4.0%	4.3%	4.2%	4.0%	4.8%
U.S. TIPS	4.4%	4.9%	4.7%	4.4%	4.4%	3.5%	4.4%	4.4%	3.5%	4.9%
U.S. Credit (All Maturities)	5.9%	4.3%	n/a	4.9%	5.0%	n/a	5.0%	4.7%	4.3%	5.9%
U.S. Government Bonds	4.2%	3.5%	n/a	n/a	3.6%	n/a	3.8%	3.6%	3.5%	4.2%
U.S. Credit (10+ Years)	5.8%	4.1%	2.9%	n/a	5.9%	n/a	4.7%	4.3%	2.9%	5.9%
U.S. Agency MBS	4.5%	4.9%	n/a	4.7%	4.2%	n/a	4.6%	4.6%	4.2%	4.9%
Global Ex-U.S. Gov't. Bonds	2.6%	4.5%	5.4%	4.2%	3.0%	2.7%	3.7%	4.0%	2.6%	5.4%
U.S. Government (10+ Years)	4.0%	3.2%	4.3%	3.0%	4.0%	3.8%	3.7%	3.7%	3.0%	4.3%
Alternative										
U.S. Bank Loans	7.8%	6.5%	5.0%	8.9%	5.6%	7.2%	6.8%	6.6%	5.0%	8.9%
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USD EM Debt	7.1%	5.8%	6.4%	6.8%	8.0%	7.5%	6.9%	6.9%	5.8%	8.0%
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Other										
Hedge Funds (Global)	6.5%	9.7%	n/a	6.4%	4.9%	n/a	6.9%	7.0%	4.9%	9.7%
U.S. Private Equity (Buyout)	7.7%	10.4%	4.1%	n/a	8.2%	n/a	7.6%	7.6%	4.1%	10.4%
Commodities	4.2%	n/a	4.8%	8.4%	2.9%	2.2%	4.5%	4.6%	2.2%	8.4%



Return forecasts sourced directly from each provider. All data is based on 10-year geometric assumptions. Research Affiliates data is as of 1/31/2023. BNY Mellon data is as of 9/30/2022

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Past performance is no guarantee of future results.

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