MILWAUKEE ERS Employes' Retirement System

City of Milwaukee
Employes' Retirement System

Bernard J. Allen
Executive Director

David M. Silber, CFA, CAIA
Chief Investment Officer

Melody Johnson
Deputy Director

June 2, 2023

Mr. Jim Owczarski
City Clerk
Room 205, City Hall

Dear Mr. Owczarski:

Please be advised that an Investment Committee Meeting of the Annuity and Pension Board has been scheduled for **Thursday, June 8, 2023 at 9:00 a.m.** This meeting will be conducted via teleconference.

Special Notice: Instructions for the public on how to observe the meeting will be available on the ERS's website (www.cmers.com) prior to the meeting.

The agenda is as follows:

Please be advised that the Investment Committee may vote to convene in closed session on the following item (I.) as provided in Section 19.85(1)(e), Wisconsin State Statutes, to deliberate or negotiate the purchasing of public properties, the investing of public funds, or conducting other specified public business, whenever competitive or bargaining reasons require a closed session. The Investment Committee may then vote to reconvene in open session following the closed session.

I. Approval of Mesirow Private Equity Fund IX, L.P. Side Letter.
II. Approval of Loomis Sayles Guideline Waiver.
III. Callan 2023 Asset-Liability Study Phase 3 Presentation.
IV. Approval of Asset Allocation Mix.

Please be advised that the Investment Committee may vote to convene in closed session on the following item (V.) as provided in Section 19.85(1)(e), Wisconsin State Statutes, to deliberate or negotiate the purchasing of public properties, the investing of public funds, or conducting other specified public business, whenever competitive or bargaining reasons require a closed session. The Investment Committee may then vote to reconvene in open session following the closed session.

V. Callan Real Estate Presentation.
VI. Callan Real Estate Structure Review and New Manager Allocation Presentation.
VII. Approval of Real Estate Manager Structure.
VIII. Chief Investment Officer Report

Sincerely,

Bernard J. Allen

Bernard J. Allen
Executive Director

BJA:jmw

789 N. Water Street, Suite 300, Milwaukee, WI 53202 • Phone 414-286-3557 or 1-800-815-8418 • Fax 414-286-8428

Memorandum

To: CMERS Investment Committee
From: Erich Sauer, CFA, CAIA
Date: June 8, 2023
Re: Loomis Sayles Guideline Waiver

Attached you will find a request from Loomis Sayles for a guideline waiver. Our guidelines require Loomis to sell asset backed securities downgraded below Baa3/BBB- within 90 days. Loomis is requesting a waiver to this guideline with respect to one specific security that was recently downgraded. The waiver would only apply to the security mentioned in Loomis' request.

As explained in their memo, the security in question is an asset-backed security with a collateral pool of airplanes. The airplanes are all currently leased, and Loomis has a favorable view of the security given the valuation, and their outlook for the travel industry.

The amount of the security that Loomis holds in our portfolio is small, with a value of approximately $130,000 or 0.04% of the portfolio. The guideline waiver would not give Loomis the ability to add to the position – only to continue to hold what is already in the portfolio. Both ERS Staff and Callan are comfortable with this request, and recommend approval of the guideline waiver for this position.

Stephanie S. Lord, CFA, CIC
Vice President
Senior Relationship Manager

slord@loomissayles.com
630.581.5054 cell

LOOMIS SAYLES & COMPANY, L.P.

May 22, 2023

Mr. Jerry Allen
City of Milwaukee ERS
789 North Water Street
Suite 300
Milwaukee, WI 53202

Re: Downgrade Notice
City of Milwaukee Employees Retirement System (Z422N3)

Dear Mr. Allen,

On 5/16/23, S&P downgraded WAAV 2017-1A A 144A 3.844 11/15/42 (Security ID 94353WAA3) from BBB- to BB and current ratings are NR/BB/NR. The guidelines state the account may not hold asset-backed securities (excl. corp bond sinkers) unless rated at least Baa3/BBB-. Client must be notified of downgrades within 3 business days, provide weekly updates thereafter, and sell within 90 days.

We are requesting an extension to hold this security indefinitely as we have no intention of selling the bond based on the fundamentals of the credit and valuation.

As of 5/16/23:

Security ID	Security Name	Shares	Market value	% of total
94353WAA3	WAAV 2017-1A A 144A 3.844 11/15/42	164,174.07	129,827.06	0.04

Below is some additional detail from our Research Department:

S&P just downgraded Class A of aircraft ABS WAAV 2017-1A from BBB to BB. We have $38 million MV exposure to the Class A. We continue to keep our internal rating at “bbb”, recommend to continue to hold the bonds if allowed by investment guidelines and adding on possible weaknesses from forced selling at LRR1 level (below 80). Class A is currently rated BB/BBB+ by SP & KBRA.

Performance of Aircraft ABS WAAV 2017-1A has improved significantly over last 12 months. During COVID over 20% aircraft collateral were off lease sitting on the ground. Servicer/Issuer has managed portfolio actively, with recovery of airtravel, servicer successfully placed or sold all off-lease aircraft. Currently all aircraft are on lease aside from one aircraft with lease expiring in six months, which has already been placed with another airline.

LTV of Class A of WAAV 2017-1A (73%) is in-line with other BBB rated Class A of Aircraft ABS. S&P just affirmed Class A of WAAV 2019-1 at BBB+ with similar LTV. Analytics: At price of 79, Class A of WAAV 17-A is +665/10.25%/4.3Yr, which is attractive at BBB and still fair at BB.

Stephanie S. Lord, CFA, CIC
Vice President
Senior Relationship Manager

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LOOMIS SAYLES & COMPANY, L.P.

S&P's downgrade on Class A is mostly driven by limited principal payment Class A has received, mostly due to high servicer/maintenance expense. When aircrafts sitting on the ground get put back to work, it will incur significant transition cost and maintenance expense to get ready to deliver to airlines.

Please feel free to contact me with any questions.

Best regards,

Stephanie S. Lord

Stephanie S. Lord, CFA
Senior Relationship Manager

Callan

June 8, 2023

City of Milwaukee Employes' Retirement System

2023 Asset-Liability Study

Phase III – Final Asset-Liability Results

John P. Jackson, CFA
Senior Vice President

Michael Joecken
Senior Vice President

Jason Ellement, FSA, CFA
Senior Vice President

Adam Lozinski, CFA
Senior Vice President

2023 Asset-Liability Schedule

Phase I: Asset Mix Alternatives

- Socialize Callan 2023 Capital Market Assumptions
- Consider Potential Alternative Asset Mixes
- Determine Actuarial Discount Rate Going Forward
- Scheduled Completion: **February 9, 2022**

Phase II: Preliminary Asset - Liability Results

- Analyze alternative asset mixes
- Review asset-liability results
- Scheduled completion: **May 5, 2023**

Phase III: Final Asset - Liability Results

- Review asset-liability results
- Determine appropriate asset allocation
- Scheduled completion: **June 8, 2023**

Goal of the Study

- The goal of this asset-liability study is to establish a long-term strategic asset allocation target for the City of Milwaukee Employes' Retirement System pension fund (the "Fund").
- An appropriate asset allocation will depend on the Fund's investment objectives.
  - Minimize costs over the long run (long-term goal)
  - How much return generation (from beta and alpha) is necessary to lower costs and/or improve funded status?
- Investment solution is an optimal balance between sustainable funded status volatility and minimization of costs over the long run.
- Asset allocation will vary by the unique circumstances of the Fund.
- No "one-size-fits-all" solution exists.

Callan 2023 – 2032 Capital Market Assumptions

Asset Class	Index	10-Year Expected Return	30-Year Expected Return	Standard Deviation
Equities				
Broad U.S. Equity	Russell 3000	7.35%	7.95%	18.05%
Large Cap U.S. Equity	S&P 500	7.25%	7.75%	17.75%
Small/Mid Cap U.S. Equity	Russell 2500	7.45%	8.25%	22.15%
Global ex-U.S. Equity	MSCI ACWI ex USA	7.45%	8.20%	21.25%
Developed ex-U.S. Equity	MSCI World ex USA	7.24%	7.75%	20.15%
Emerging Market Equity	MSCI Emerging Markets	7.45%	8.50%	25.70%
CMERS Public Equity	Custom Blend[1]	7.56%	8.17%	18.46%
Fixed Income				
Core Fixed Income	Bloomberg Barclays Aggregate	4.25%	4.65%	4.10%
TIPS	Bloomberg Barclays TIPS	4.00%	4.35%	5.30%
High Yield	Bloomberg Barclays High Yield	6.25%	6.40%	11.75%
Bank Loans	S&P/LSTA Leveraged Loan Index	6.10%	6.05%	9.70%
EMD	EMBI Global Diversified	5.85%	6.05%	10.65%
CMERS Fixed Income	Custom Blend[2]	5.06%	5.34%	5.06%
Alternatives				
Core Real Estate	NCREIF ODCE	5.75%	6.50%	14.20%
Private Equity	Cambridge Private Equity	8.50%	9.15%	27.60%
Absolute Return	Callan Hedge FoF Database	5.55%	5.65%	8.45%
Commodities	Bloomberg Commodity	3.50%	3.65%	18.00%
Liquid Real Assets	Custom Blend[3]	6.08%	6.49%	9.83%
Cash Equivalents	90-Day T-Bill	2.75%	2.90%	0.90%
Inflation	CPI-U	2.50%	2.35%	1.60%

1 - 44% Large Cap US Equity / 11% Small/Mid Cap US Equity / 34% Non-US Equity / 11% Emerging Markets Equity
2 - 60% Core Fixed Income / 36% High Yield / 4% Cash
3 - 50% Large Cap US Equity / 35% TIPS / 15% Commodities

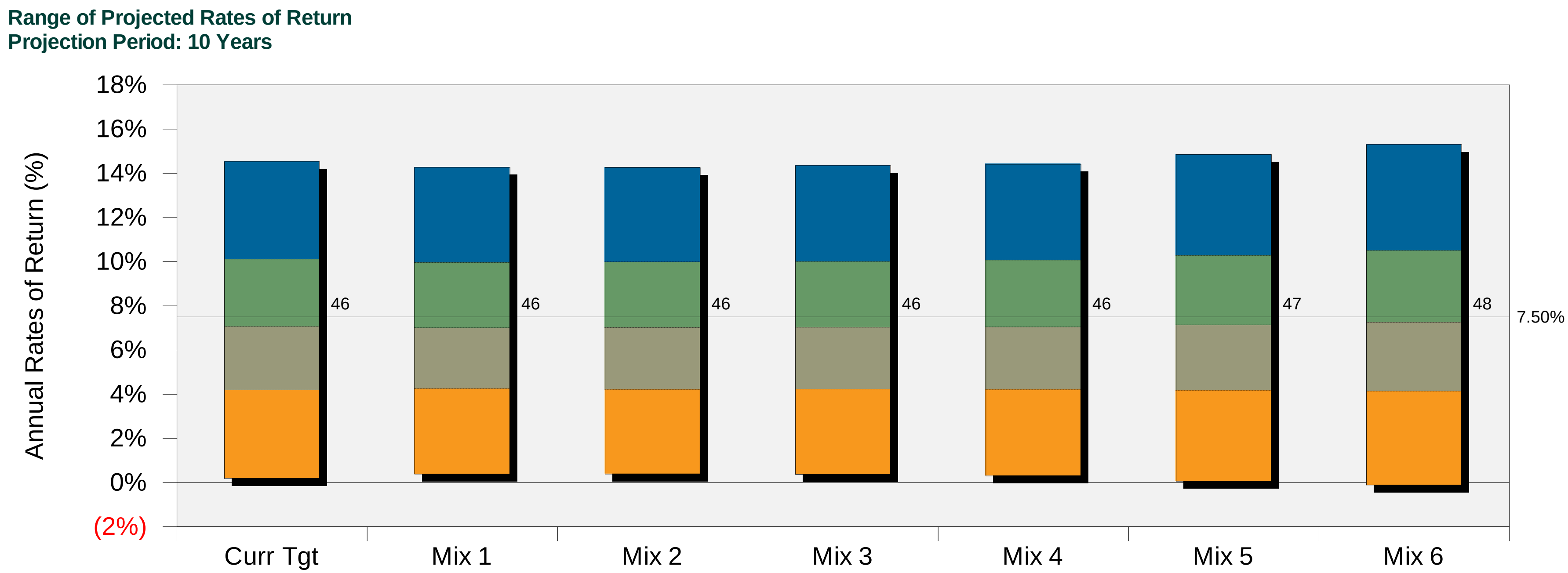
- Capital market expectations represent passive exposure (beta only) with the exception of privately-traded classes
  - All return projections are net of fees

Alternative Asset Mixes

				Alternative Asset Mixes						Change Relative to Target					
	Target	Min	Max	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
Public Equity	44.00%			39.00%	40.00%	39.00%	42.00%	44.00%	45.00%	-5.00%	-4.00%	-5.00%	-2.00%	0.00%	1.00%
Fixed Income	23.00%			28.99%	27.99%	27.99%	25.99%	23.00%	20.00%	5.99%	4.99%	4.99%	2.99%	0.00%	-3.00%
- Core	13.75%			18.05%	16.76%	16.86%	16.32%	13.75%	11.88%	4.30%	3.01%	3.11%	2.57%	0.00%	-1.88%
- High Yield	8.25%			9.94%	10.23%	10.13%	8.67%	8.25%	7.13%	1.69%	1.98%	1.88%	0.42%	0.00%	-1.13%
- Cash	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Real Assets	13.00%			13.00%	14.00%	14.00%	14.01%	14.00%	14.00%	0.00%	1.00%	1.00%	1.01%	1.00%	1.00%
- Liquid Real Assets	3.30%	3.30%	3.30%	3.30%	3.30%	3.30%	3.30%	3.30%	3.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
- Private Real Estate	9.70%	9.70%	10.70%	9.70%	10.70%	10.70%	10.71%	10.70%	10.70%	0.00%	1.00%	1.00%	1.01%	1.00%	1.00%
Private Equity	10.00%	10.00%	14.00%	12.00%	11.00%	12.00%	11.00%	12.00%	14.00%	2.00%	1.00%	2.00%	1.00%	2.00%	4.00%
Absolute Return	10.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	-3.00%	-3.00%	-3.00%	-3.00%	-3.00%	-3.00%
	100.00%			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
30-Year Expected Return	7.55%			7.50%	7.50%	7.52%	7.54%	7.64%	7.75%	-0.05%	-0.04%	-0.03%	0.00%	0.10%	0.21%
10-Year Expected Return	7.05%			7.01%	7.01%	7.02%	7.04%	7.13%	7.23%	-0.05%	-0.05%	-0.03%	-0.01%	0.08%	0.18%
Standard Deviation	12.93%			12.51%	12.55%	12.61%	12.76%	13.33%	13.90%	-0.42%	-0.38%	-0.32%	-0.17%	0.40%	0.97%
Public & Private Equity	54%			51%	51%	51%	53%	56%	59%						
Fixed Income + Absolute Return	33%			36%	35%	35%	33%	30%	27%						
Core / Fixed Income	60%			62%	60%	60%	63%	60%	59%						
Illiquid Investments	30%			29%	29%	30%	29%	30%	32%						

- The above table illustrates six alternative mixes:
  - 10-year return expectations range from 7.00% to 7.25%
  - 30-year return expectations range from 7.50% to 7.75% (a 0.5% increase over a 30-year horizon)
- Alternative asset mixes shift 2-5% capital to private real estate and private equity and reduce Absolute Return by 3.0%
- Mixes 1-4 reduce risk while Mixes 5-6 increase risk

10-Year Returns

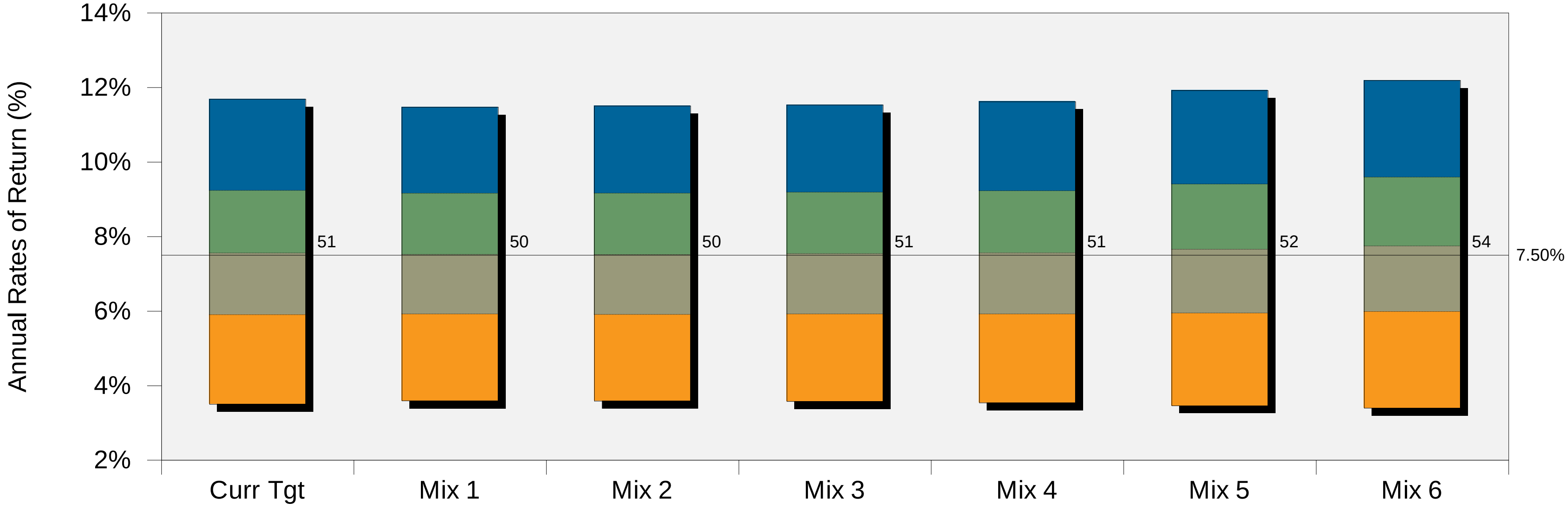


	Curr Tgt	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
5th Percentile	14.52%	14.27%	14.25%	14.35%	14.41%	14.85%	15.30%
25th Percentile	10.09%	9.94%	9.97%	9.99%	10.05%	10.26%	10.49%
Median	7.05%	7.01%	7.01%	7.02%	7.04%	7.13%	7.23%
75th Percentile	4.17%	4.23%	4.20%	4.21%	4.19%	4.16%	4.12%
95th Percentile	0.19%	0.39%	0.38%	0.37%	0.30%	0.07%	(0.10%)
Prob > 7.50%	46.1%	45.7%	45.6%	45.8%	45.9%	46.9%	47.9%

- Probability of meeting the 7.5% investment return assumption over 10 years ranges from 45.7% to 47.9%

30-Year Returns

Range of Projected Rates of Return
Projection Period: 30 Years



	Curr Tgt	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
5th Percentile	11.69%	11.47%	11.51%	11.54%	11.62%	11.92%	12.19%
25th Percentile	9.23%	9.15%	9.16%	9.18%	9.22%	9.40%	9.58%
Median	7.55%	7.50%	7.50%	7.52%	7.54%	7.64%	7.75%
75th Percentile	5.89%	5.91%	5.90%	5.91%	5.92%	5.94%	5.98%
95th Percentile	3.50%	3.59%	3.59%	3.58%	3.54%	3.46%	3.40%
Prob > 7.50%	50.8%	50.1%	50.1%	50.5%	50.9%	52.3%	54.0%

- Over a longer horizon, all the portfolios are expected to meet the 7.5% investment return assumption
- Probability of meeting 7.5% ranges from 50.1% to 54.0%

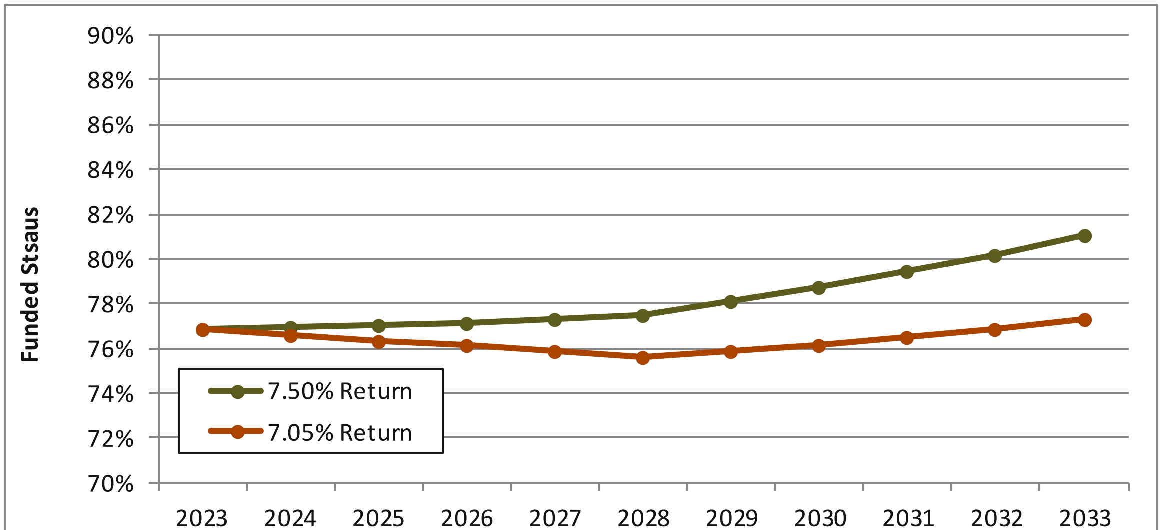
Actuarial Liability Model

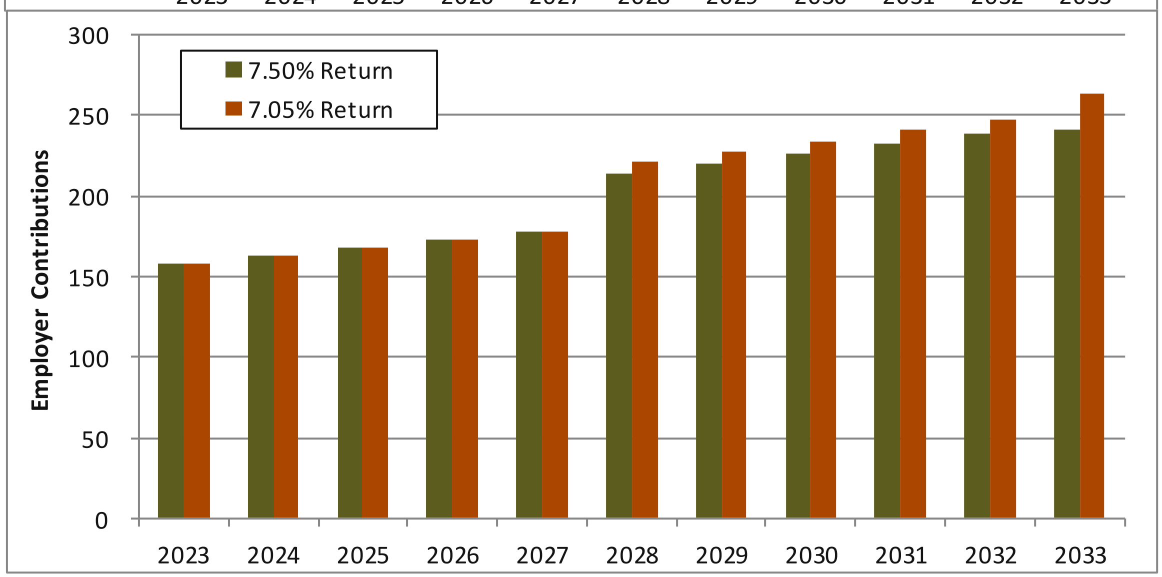
- Callan and Cavanaugh Macdonald utilize the same actuarial software
  - Cavanaugh Macdonald supplied Callan with the programming code for liability modelling
- Callan reflected the 5-year stabilization funding policy
  - First reset occurs 1/1/2023 – 1/1/2028
  - 2023 – 2028 Employer Rate = 27%

January 1, 2023 Actuarial Valuation	Estimated
Actuarial Accrued Liability	$7,063M
Market Value of Assets	$5,427M
Actuarial Value of Assets	$5,748M
Market Funded Status (MVA/AL)	76.8%
Actuarial Funded Status (AVA/AL)	81.4%
2022 Employer Contribution ($)	$88M
2022 Employer Contribution (%)	15.21%

Key Assumptions	Actuarial Assumption	Callan 10-year Expectation	Callan 30-year Expectation
Investment Return	7.50%	7.05%	7.55%
Price Inflation	2.50%	2.50%	2.35%

Expected Return Projection Over 10 Years

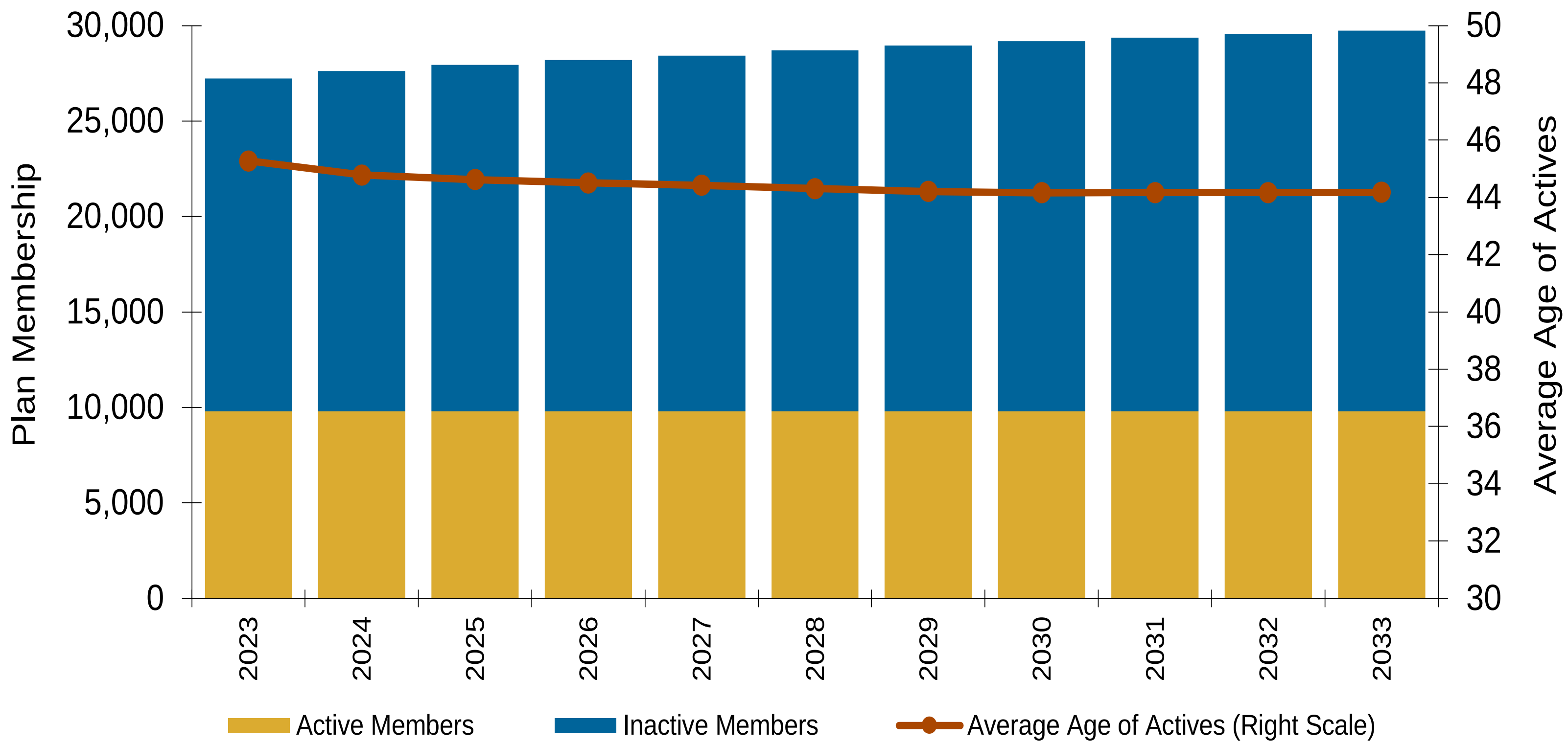




- A return difference of 0.45% results in a funded status that is 4% lower at the end of 10 years
  - All liability projections reflect a 7.5% investment return assumption

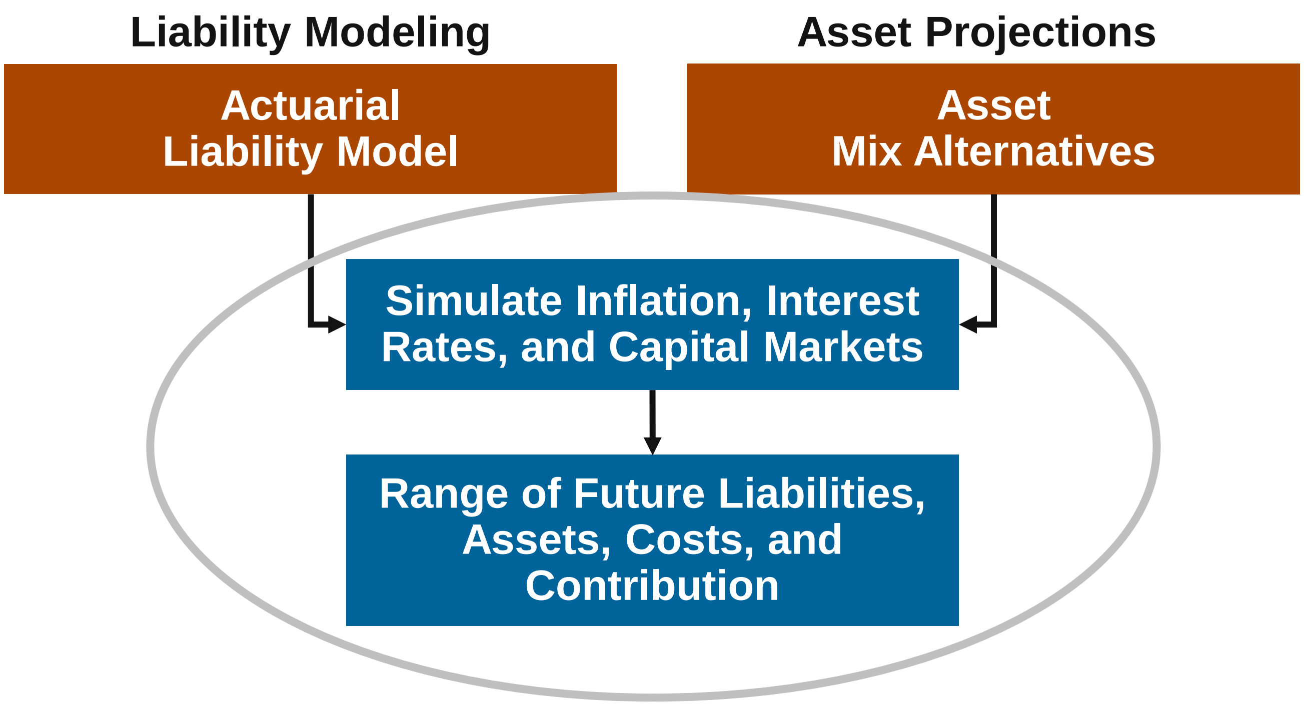
- Relative to the assumed 7.5% rate, the employer contributions for the current target, based on Callan's 10-year return expectation, are higher in the 2028 – 2032 stabilization period and the 2033 – 2037 stabilization period

Active Plan Membership



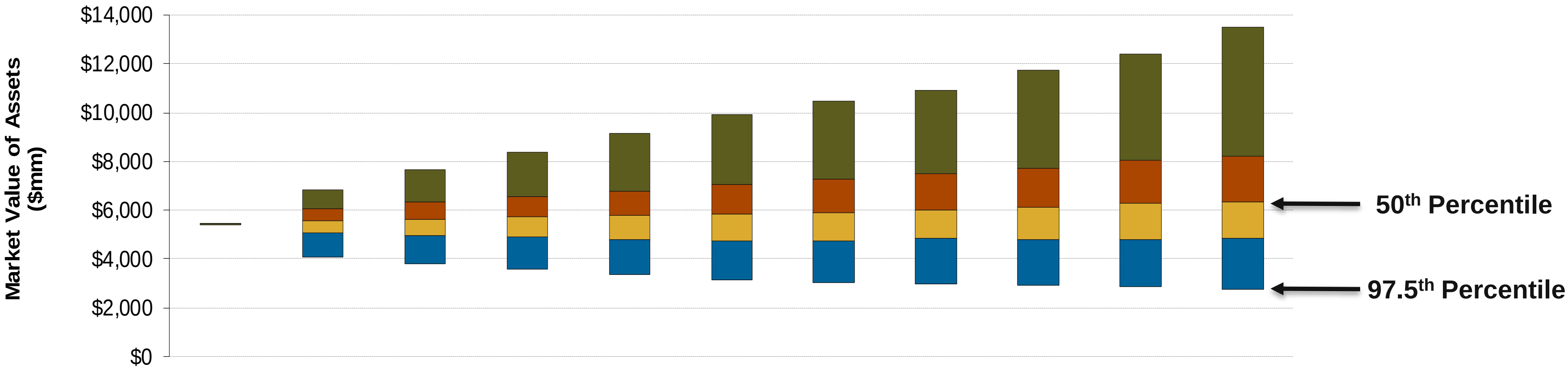
- Plan is assumed to stay open
  - Future new hires replace exits due to retirement, death, disability, and withdrawal
  - A constant active membership implies 0% workforce growth
- Average age of active members is 44 - 45 years

Simulate Financial Condition



- Generate 2,000 simulations per year, per asset mix to capture possible future economic scenarios and their effect on the portfolio
- The simulation results are then ranked from highest to lowest to develop probability distributions

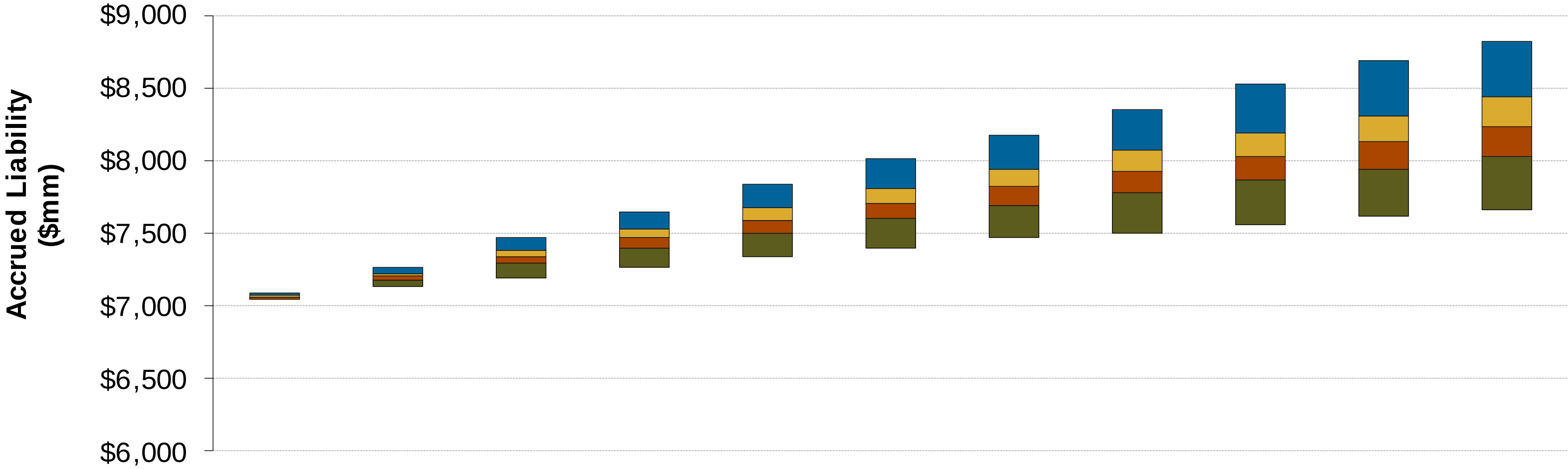
Market Value of Assets (Current Target)



Percentile	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
2.5th	$5,427	$6,833	$7,654	$8,396	$9,149	$9,954	$10,457	$10,930	$11,731	$12,418	$13,509
25th	5,427	6,040	6,320	6,548	6,763	7,071	7,290	7,475	7,744	8,040	8,229
50th	5,427	5,559	5,647	5,744	5,789	5,823	5,928	6,011	6,149	6,262	6,352
75th	5,427	5,088	4,980	4,925	4,810	4,768	4,764	4,859	4,787	4,826	4,847
97.5th	5,427	4,080	3,811	3,575	3,353	3,149	3,046	2,993	2,946	2,879	2,771
Range		2,753	3,843	4,821	5,796	6,805	7,411	7,938	8,785	9,539	10,738

- The expected outcome is the 50th percentile
  - There is a 50% chance that asset values will be above the value shown and a 50% chance that asset values will be below the value shown
  - Expected 10-Year annualized growth in assets is 1.6% per year
- The worse-case scenario is the 97.5th percentile
  - E.g., There is a 1-in-40 chance (2.5% probability) that the 1/1/2033 market value of assets will be $2.771B or less

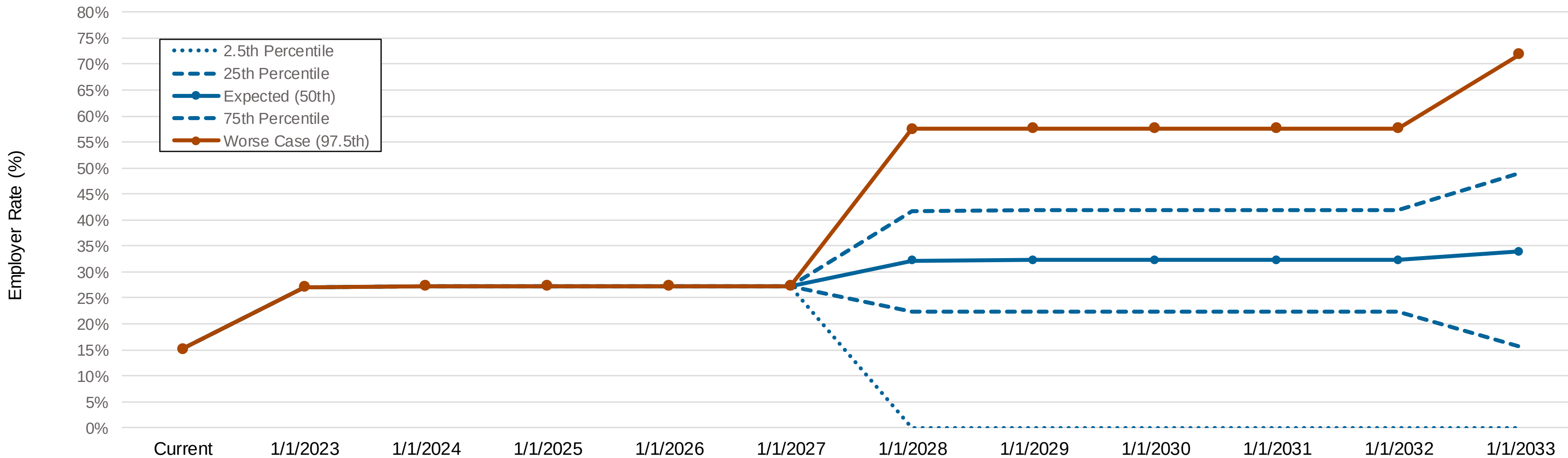
Actuarial Accrued Liability



Percentile	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
97.5th	$7,063	$7,271	$7,464	$7,651	$7,836	$8,010	$8,181	$8,351	$8,519	$8,688	$8,822
75th	7,063	7,226	7,381	7,528	7,673	7,813	7,943	8,066	8,192	8,312	8,436
50th	7,063	7,204	7,336	7,466	7,587	7,701	7,817	7,927	8,030	8,126	8,226
25th	7,063	7,180	7,292	7,398	7,502	7,598	7,684	7,778	7,861	7,942	8,024
2.5th	7,063	7,133	7,200	7,267	7,336	7,390	7,464	7,503	7,560	7,614	7,661
Range	0	138	265	384	500	619	717	848	959	1,074	1,161

- Plan liabilities are increasing over the next 10 years
  - Liabilities increase with ongoing benefit accrual, interest cost and are reduced by benefit payments
  - Expected 10-Year annualized growth in liability is 1.5% per year
  - Investment return assumption = 7.5% in all scenarios and years

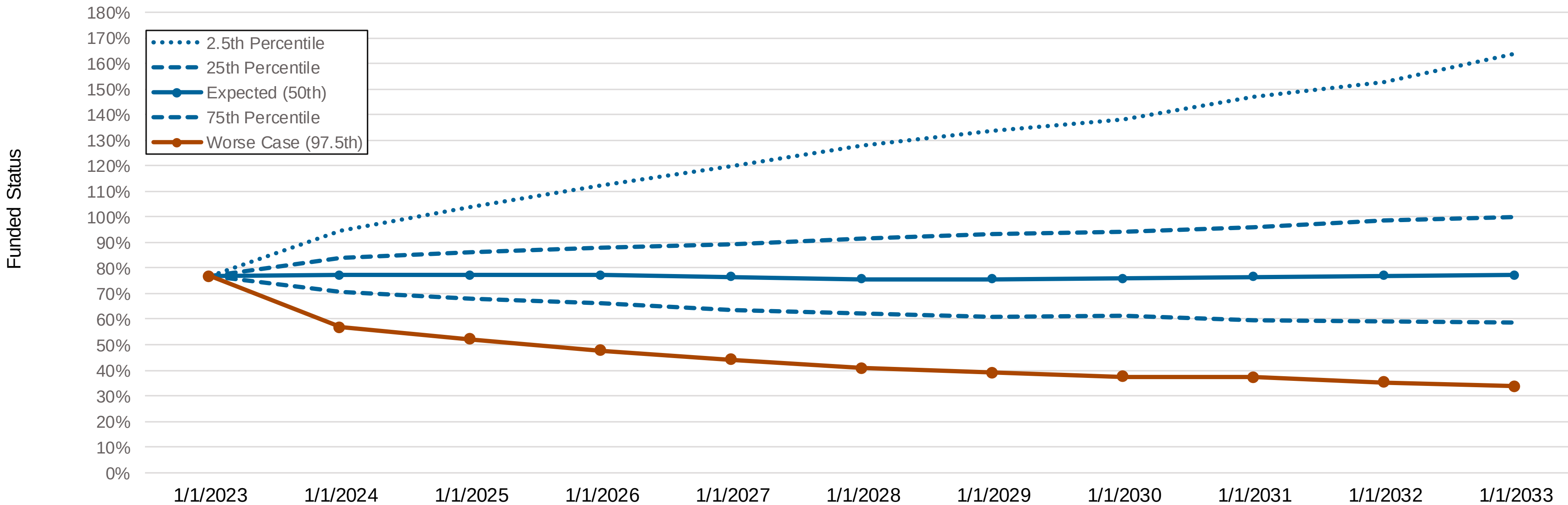
Employer Rate (Current Target)



		2023 - 2027 Stabilization Period					2028 - 2032 Stabilization Period					2033-2037 Stabilization Period
	Current	**1/1/2023**	**1/1/2024**	**1/1/2025**	**1/1/2026**	**1/1/2027**	**1/1/2028**	**1/1/2029**	**1/1/2030**	**1/1/2031**	**1/1/2032**	**1/1/2033**
Worse Case (97.5th)	15.2%	27%	27%	27%	27%	27%	58%	58%	58%	58%	58%	72%
75th Percentile	15.2%	27%	27%	27%	27%	27%	42%	42%	42%	42%	42%	49%
Expected (50th)	15.2%	27%	27%	27%	27%	27%	32%	32%	32%	32%	32%	34%
25th Percentile	15.2%	27%	27%	27%	27%	27%	22%	22%	22%	22%	22%	16%
2.5th Percentile	15.2%	27%	27%	27%	27%	27%	0%	0%	0%	0%	0%	0%

- Employer rate is expected to increase to 27% for the next stabilization period
- Investment performance during the five-year period (2023 – 2027) will be a primary driver of the employer rate in future stabilization periods
  - The employer rate for 2028 – 2032 is expected to increase to 32% but could spike as high as 58%
  - The employer rate for 2033 – 2037 is expected to increase to 34% but could spike as high as 72%

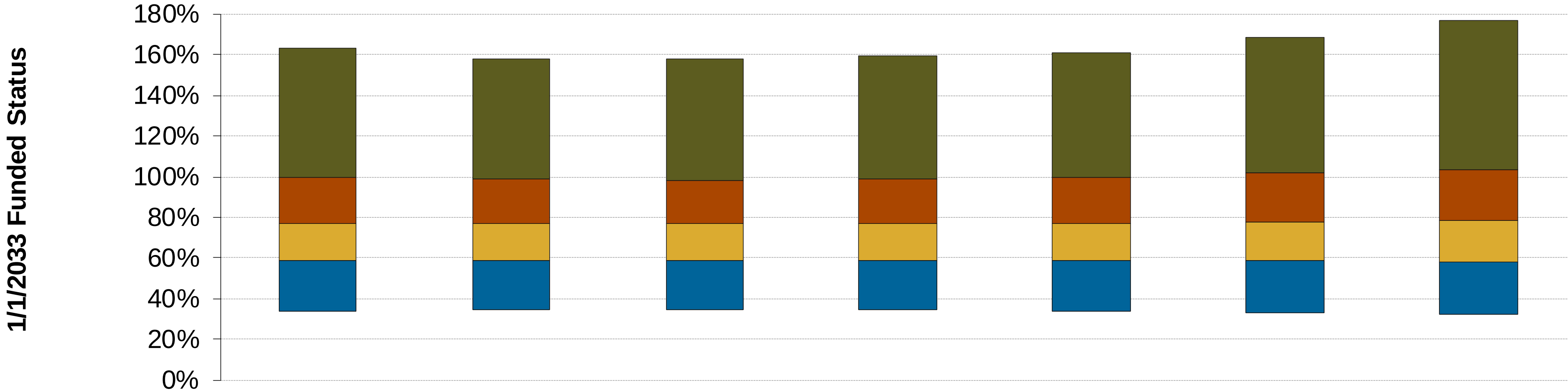
Projected Funded Status (Current Target)



	1/1/2023	1/1/2024	1/1/2025	1/1/2026	1/1/2027	1/1/2028	1/1/2029	1/1/2030	1/1/2031	1/1/2032	1/1/2033
2.5th Percentile	76.8%	95%	104%	112%	120%	128%	134%	138%	147%	153%	164%
25th Percentile	76.8%	84%	86%	88%	89%	92%	93%	94%	96%	99%	100%
Expected (50th)	76.8%	77%	77%	77%	76%	76%	76%	76%	77%	77%	77%
75th Percentile	76.8%	71%	68%	66%	64%	62%	61%	61%	60%	59%	59%
Worse Case (97.5th)	76.8%	57%	52%	48%	44%	41%	39%	37%	37%	35%	34%

- Funded status is expected to be flat over the next 10 years
  - An expected return of 7.05% relative to an assumed investment return of 7.5% is a headwind

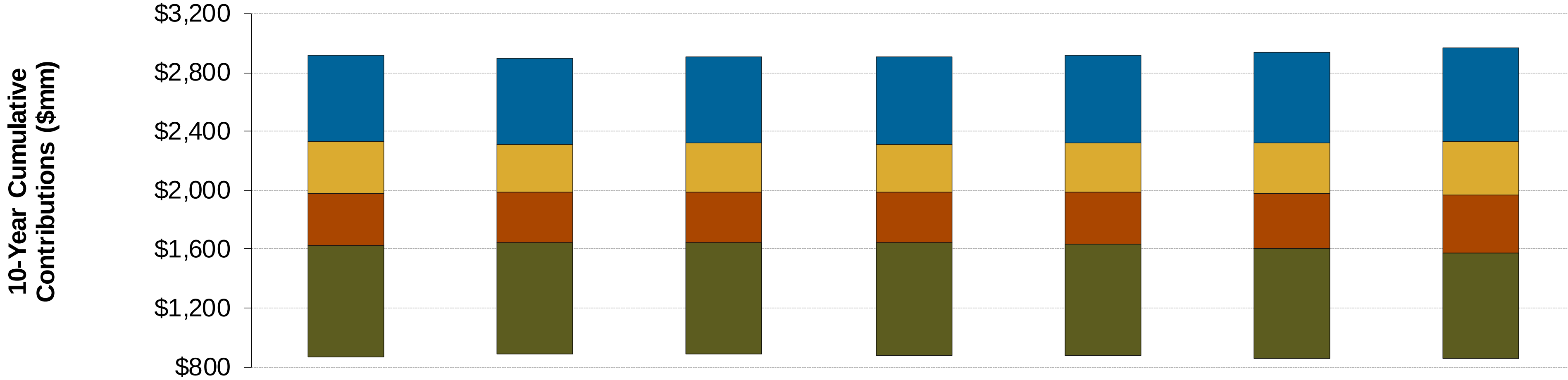
10-Year Projected Funded Status



Percentile	Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
2.5th	164%	158%	158%	159%	161%	169%	177%
25th	100%	99%	99%	99%	99%	102%	104%
50th	77.2%	77.0%	77.0%	77.0%	77.1%	77.8%	78.7%
75th	59%	59%	59%	59%	59%	59%	58%
97.5th	33.7%	34.6%	34.5%	34.4%	34.1%	33.1%	32.2%
Expected Return	7.05%	7.01%	7.01%	7.02%	7.04%	7.13%	7.23%
Standard Deviation	12.93%	12.51%	12.55%	12.61%	12.76%	13.33%	13.90%

- Funded Status = Market Value of Assets / Actuarial Liability
  - 1/1/2023 Funded Status = 76.8%
- More aggressive mixes (Mixes 5 and 6) are expected to have a higher funded status but will have a lower funded status in a worse-case scenario

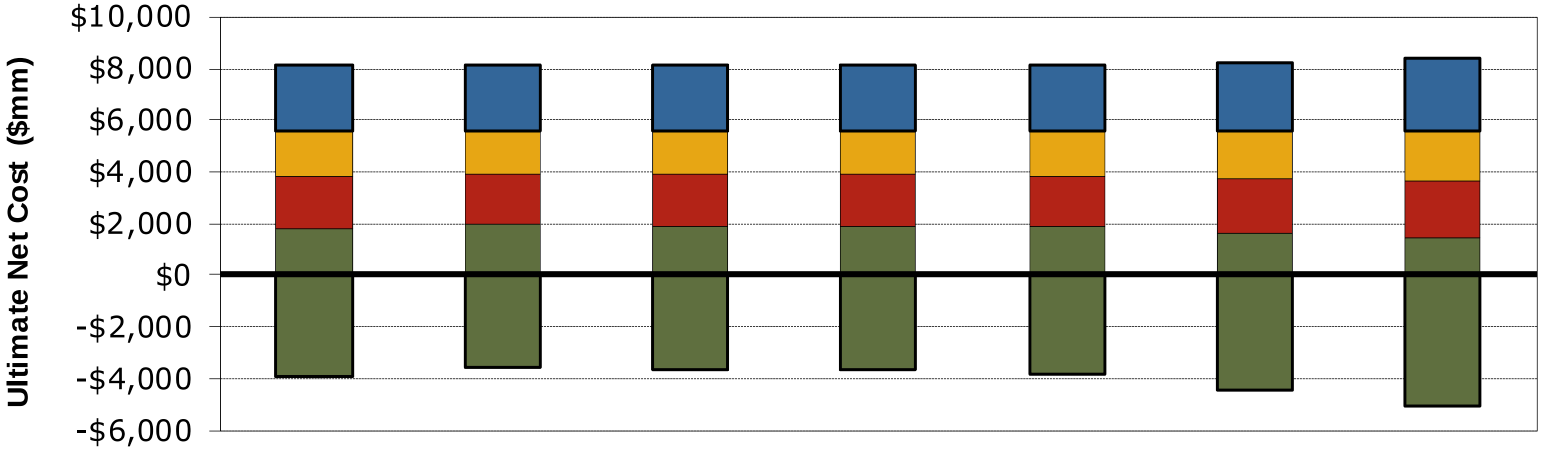
2023-2032 Cumulative Employer Contributions



Percentile	Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
97.5th	$2,920	$2,900	$2,906	$2,909	$2,917	$2,942	$2,966
75th	2,327	2,316	2,318	2,317	2,322	2,325	2,330
50th	1,982	1,993	1,990	1,990	1,986	1,976	1,964
25th	1,623	1,647	1,643	1,641	1,633	1,606	1,577
2.5th	870	885	885	877	874	861	855
Expected Return	7.05%	7.01%	7.01%	7.02%	7.04%	7.13%	7.23%
Standard Deviation	12.93%	12.51%	12.55%	12.61%	12.76%	13.33%	13.90%

- Above chart illustrates total employer contributions over 2023 – 2032
  - Expected contributions vary slightly across mixes
- More aggressive mixes are expected to result in lower employer contributions but result in higher contributions in a worse-case scenario

Ultimate Net Cost (UNC)

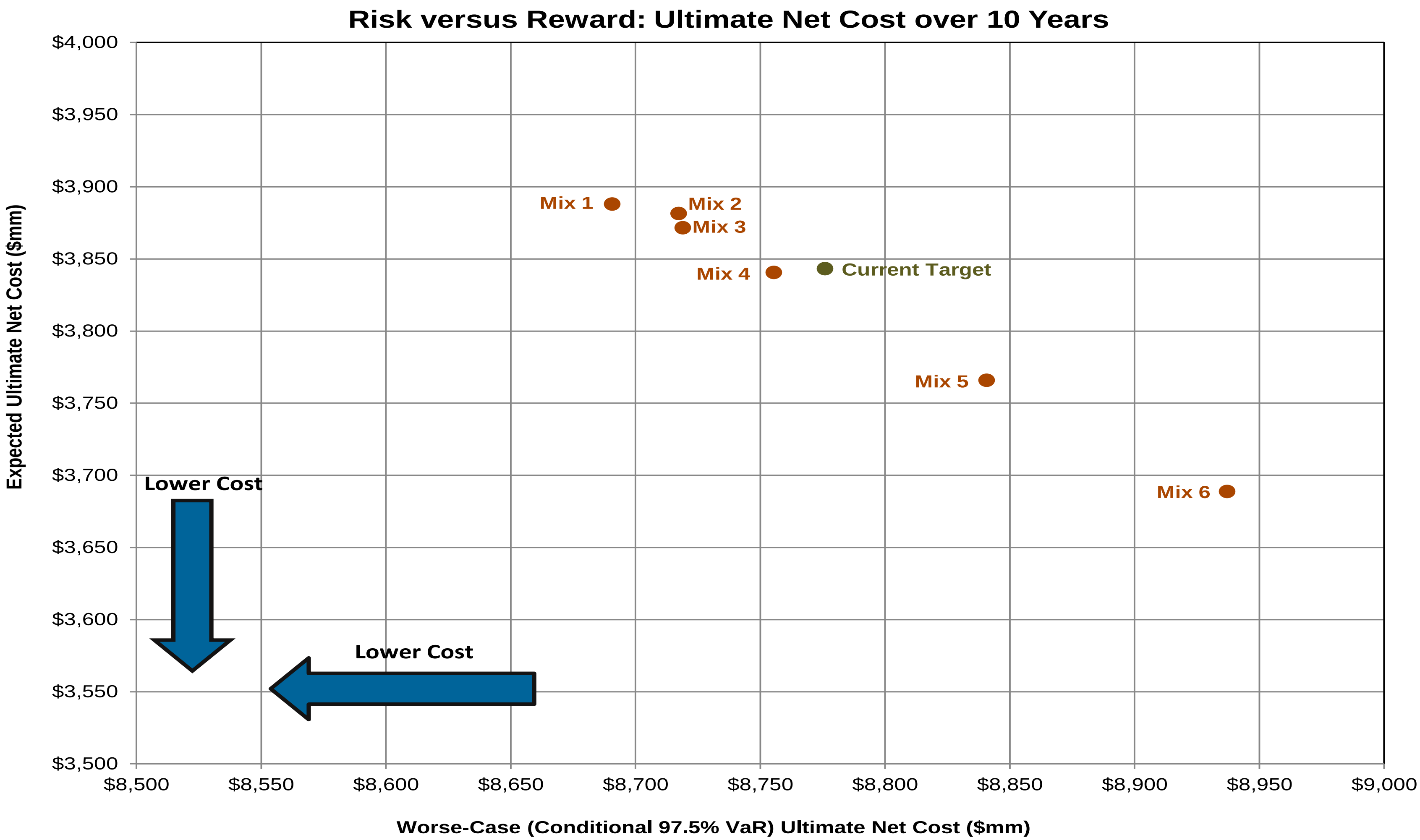


Percentile	Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
Conditional VaR *	$8,776	$8,691	$8,717	$8,719	$8,755	$8,841	$8,937
97.5th	$8,154	$8,096	$8,115	$8,119	$8,164	$8,256	$8,357
75th	5,618	5,570	5,598	5,579	5,601	5,593	5,594
50th	3,843	3,888	3,882	3,872	3,841	3,766	3,689
25th	1,808	1,944	1,919	1,914	1,860	1,664	1,461
2.5th	-3,909	-3,594	-3,658	-3,653	-3,842	-4,421	-5,099
Expected Return	7.05%	7.01%	7.01%	7.02%	7.04%	7.13%	7.23%
Standard Deviation	12.93%	12.51%	12.55%	12.61%	12.76%	13.33%	13.90%

** A measurement of "tail risk". Conditional VaR is the weighted average of losses beyond the 97.5th percentile*

- UNC = 10-Year Cumulative Contributions + 1/1/2033 Unfunded Actuarial Liability
  - UNC captures what is expected to be paid over 10 years plus what is owed at the end of the 10 year period
  - Negative numbers indicate the plan is in a surplus position at 1/1/2033
- More aggressive mixes lower UNC in the expected case but result in a greater UNC in a worse case scenario

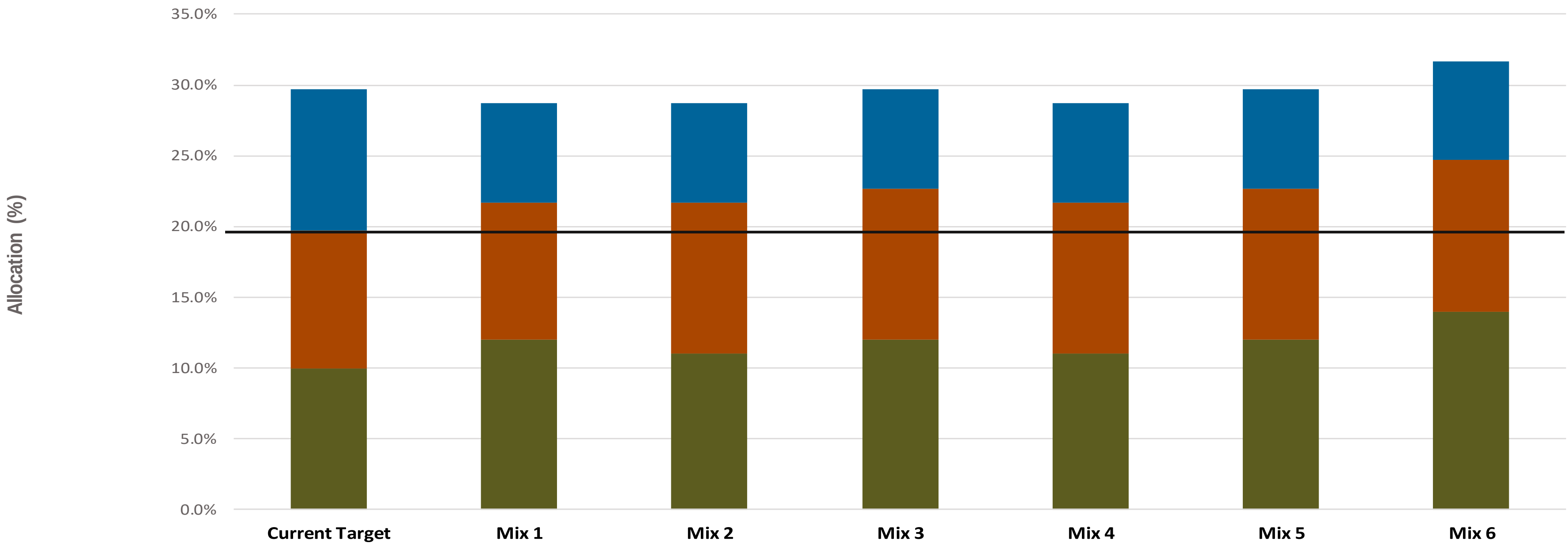
Ultimate Net Cost Graph



- Mixes 1-3 are expected to cost more but reduce worse case cost
- Mix 4 has similar expected cost as the Target but reduces worse case cost
- Mixes 5-6 are expected to reduce cost but increase worse case cost

Liquidity Analysis

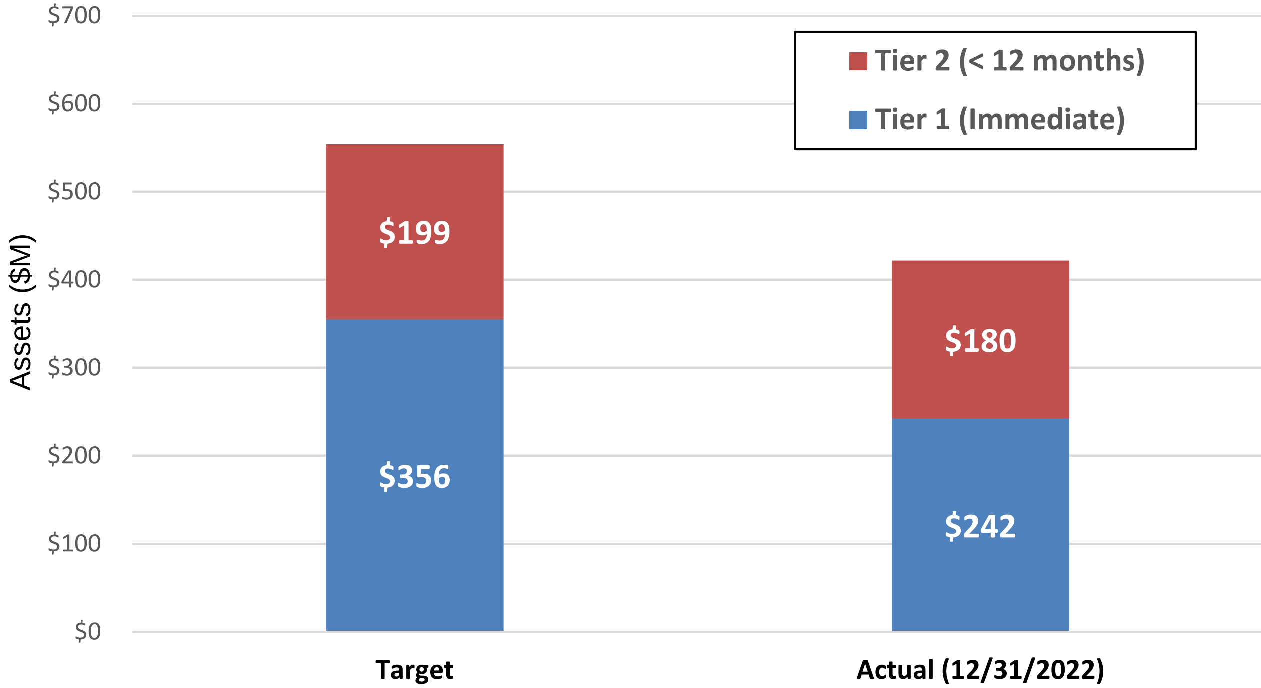
Illiquid Investments



	Current Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
Private Equity	10.0%	12.0%	11.0%	12.0%	11.0%	12.0%	14.0%
Private Real Estate	9.7%	9.7%	10.7%	10.7%	10.7%	10.7%	10.7%
Absolute Return	10.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
Illiquid Investments	19.7%	21.7%	21.7%	22.7%	21.7%	22.7%	24.7%
Increase Relative to Target		2.0%	2.0%	3.0%	2.0%	3.0%	5.0%
Core Fixed Income	14%	18%	17%	17%	16%	14%	12%

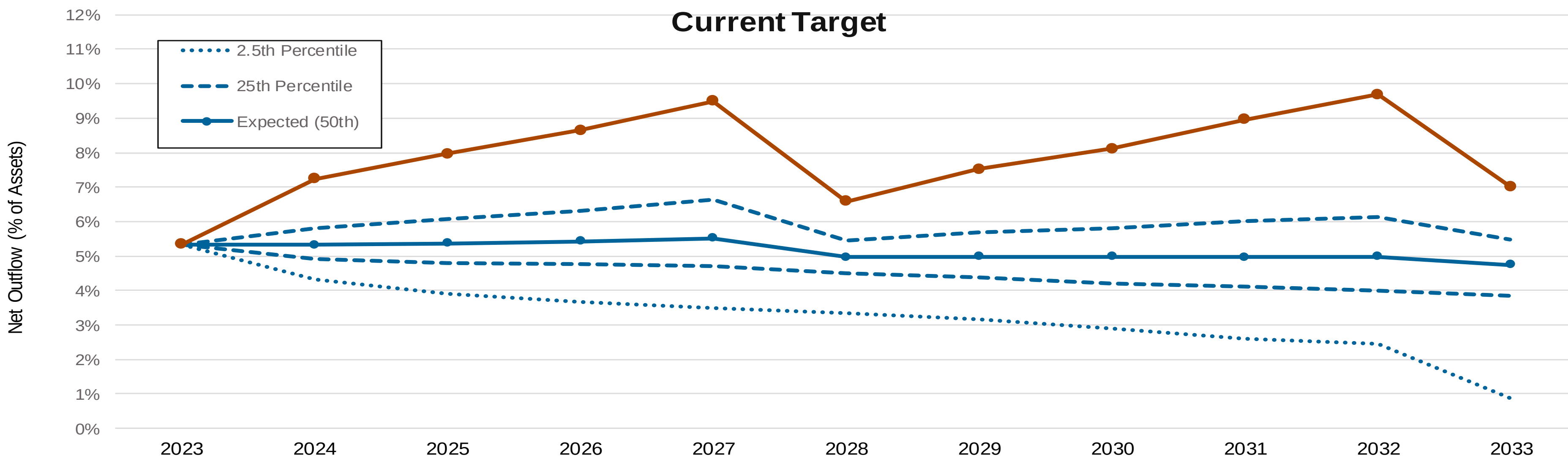
- All the alternative asset mixes consider increasing illiquid investments - private equity and private real estate - by 2-5%
  - Absolute return is also illiquid but the main concern is private equity and private real estate which can take many years to wind down
- Core fixed income assets may be liquidated to meet benefit payments in a distressed environment
  - Core fixed increases in Mixes 1 - 4

Marketable Bonds



- A liquidity buffer of marketable bonds is currently maintained in order to meet benefit payments in a distressed environment
  - Tier 1 (Immediate) includes a 1.0% strategic allocation to cash and a 5.5% target to US government bonds (totaling 6.5% of assets)
  - Tier 2 (< 12 months) is drawing from the more liquid securities within the two active core plus managers – Reams and Loomis

Liquidity Needs for Current Target



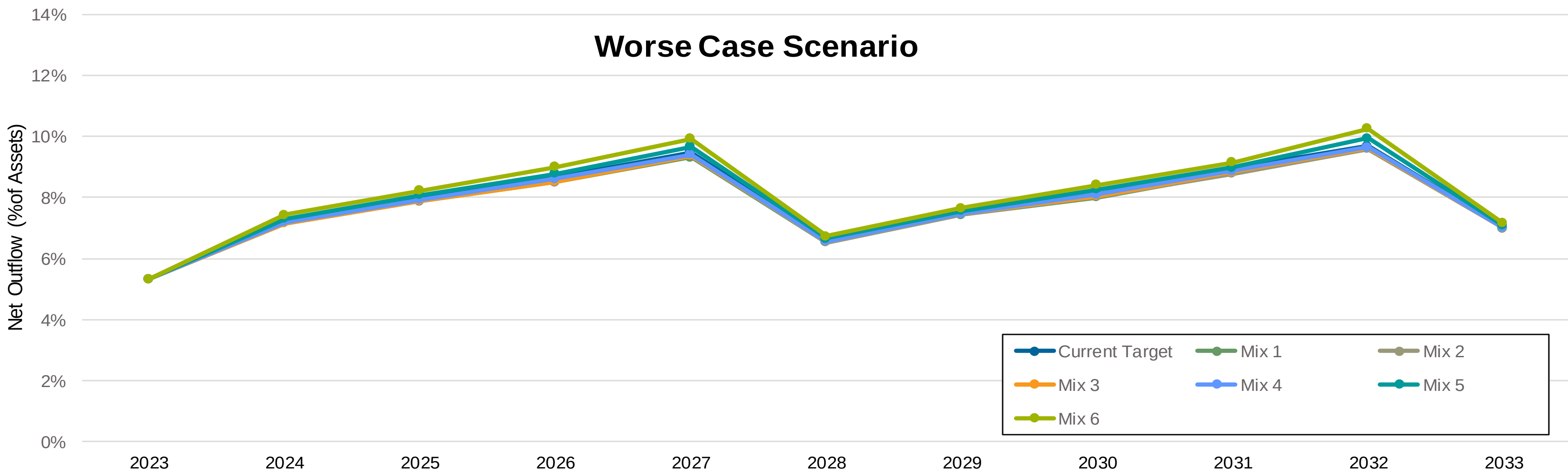
	2023 - 2027 Stabilization Period					2028 - 2032 Stabilization Period					2033-2037 Stabilization Period
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Worse Case (97.5th)	5.3%	7.2%	8.0%	8.7%	9.5%	6.6%	7.5%	8.1%	9.0%	9.7%	7.0%
75th Percentile	5.3%	5.8%	6.1%	6.3%	6.6%	5.5%	5.7%	5.8%	6.0%	6.1%	5.5%
Expected (50th)	5.3%	5.3%	5.4%	5.4%	5.5%	5.0%	5.0%	5.0%	5.0%	5.0%	4.8%
25th Percentile	5.3%	4.9%	4.8%	4.8%	4.7%	4.5%	4.4%	4.2%	4.1%	4.0%	3.9%
2.5th Percentile	5.3%	4.3%	3.9%	3.7%	3.5%	3.3%	3.2%	2.9%	2.6%	2.4%	0.9%

- Net Outflow (NOF) = Expected Benefit Payments + Admin Expenses – Employer and Employee Contributions
- Liquidity needs are moderate - high
  - NOF / Assets < 7% is typically manageable and should not impact asset allocation (green).
  - 7% < NOF / Assets < 10% may warrant careful monitoring and could impact asset allocation (yellow)
  - NOF / Assets > 10% has high liquidity needs and may preclude all illiquid investments (red)

< 7%
7 - 10%
> 10%

- Liquidity needs are expected (50th) to be manageable. In a worse case scenario, net outflow approaches 10% just before each of the reset points (2028 and 2033)

Liquidity Needs for Alternative Mixes



	2023 - 2027 Stabilization Period					2028 - 2032 Stabilization Period					2033-2037 Stabilization Period
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Current Target	5.3%	7.2%	8.0%	8.7%	9.5%	6.6%	7.5%	8.1%	9.0%	9.7%	7.0%
Mix 1	5.3%	7.2%	7.9%	8.5%	9.3%	6.5%	7.4%	8.0%	8.8%	9.6%	7.0%
Mix 2	5.3%	7.2%	7.9%	8.5%	9.4%	6.5%	7.5%	8.1%	8.8%	9.6%	7.0%
Mix 3	5.3%	7.2%	7.9%	8.5%	9.4%	6.6%	7.5%	8.1%	8.8%	9.6%	7.0%
Mix 4	5.3%	7.2%	7.9%	8.6%	9.4%	6.6%	7.5%	8.1%	8.9%	9.7%	7.0%
Mix 5	5.3%	7.3%	8.1%	8.8%	9.7%	6.7%	7.6%	8.3%	9.0%	9.9%	7.1%
Mix 6	5.3%	7.4%	8.2%	9.0%	9.9%	6.7%	7.7%	8.4%	9.1%	10.3%	7.2%

- The above chart shows worse case results for net outflow as a percentage of assets for all the asset mixes
- Aggressive mixes (5 and 6) have higher liquidity needs in a worse case scenario

< 7%
7 - 10%
> 10%

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Liquidity Stress Test (Worse Case Scenario)

	Current Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
Worse Case Financial Position [1]							
Market Value of Assets	4,517	4,516	4,516	4,517	4,516	4,517	4,521
- Liquid Assets	3,140	3,185	3,185	3,140	3,185	3,140	3,051
- Illiquid Assets	1,377	1,331	1,331	1,377	1,331	1,377	1,470
Actuarial Accrued Liability	7,063	7,063	7,063	7,063	7,063	7,063	7,063
Worse Case Funded Status	64%	64%	64%	64%	64%	64%	64%
Annual Cash Flows							
Benefit Payments & Expenses (B&E)	491	491	491	491	491	491	491
Contributions (e'er & e'ee)[2]	195	195	195	195	195	195	195
Private Equity Capital Calls[3]	100	100	100	100	100	100	100
Portfolio Income	165	175	177	176	172	168	160
Total Net Outflow	232	222	219	221	224	229	237
- as a % of liquid assets	7.4%	7.0%	6.9%	7.0%	7.0%	7.3%	7.8%
Target Marketable Bonds (MB)	458	570	551	551	513	458	402
Marketable Bonds / Net Outflow	2.0	2.6	2.5	2.5	2.3	2.0	1.7

1 - Worse Case scenario is based on the 97.5th percentile for each asset mix. Appraisal smoothing is applied to private equity and private real estate.

2 - Assumes employer contribution increases to $165M in 2024

3 - Capital commitments to private equity expected to average approcimately $100M per year. Distributions are not reflected.

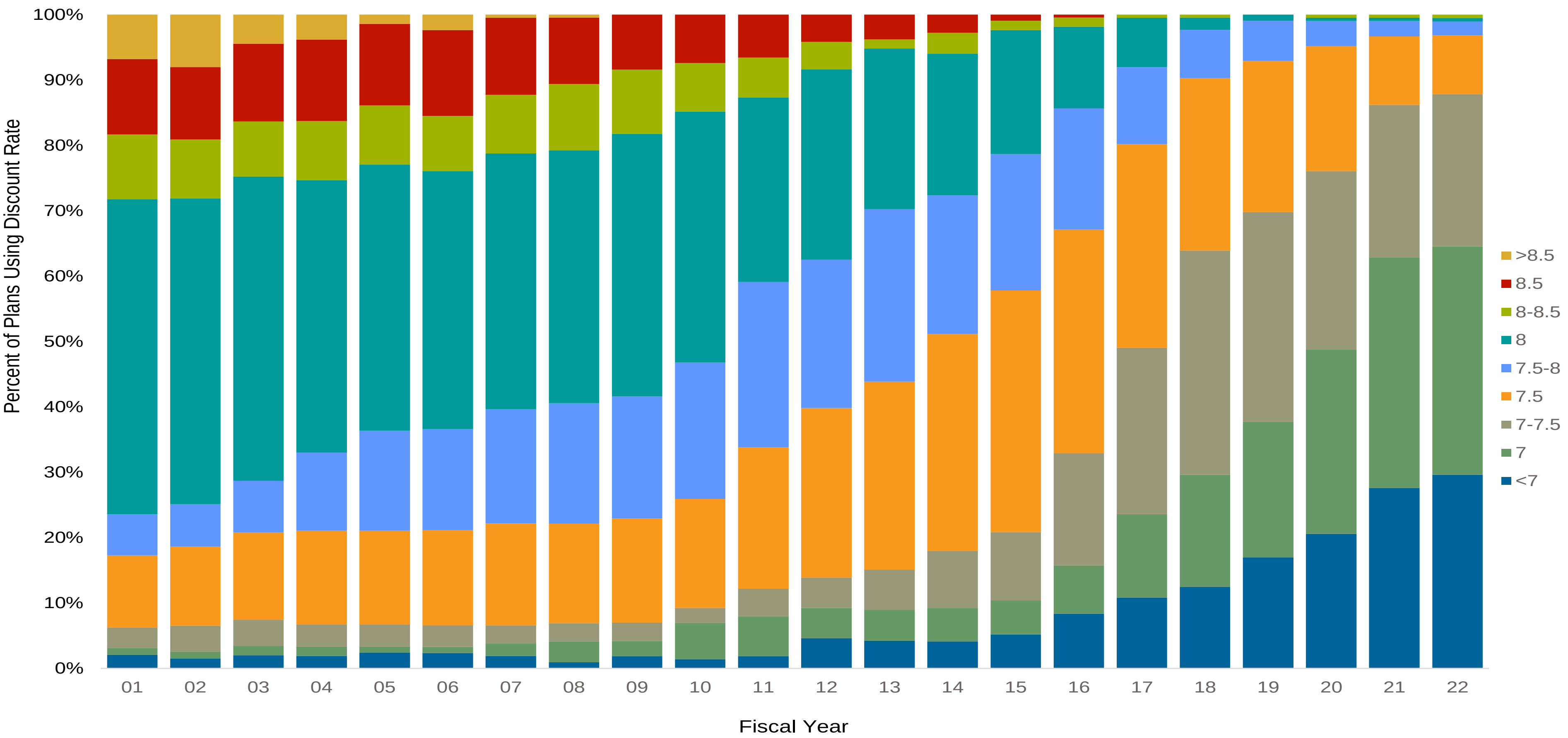
- The current target is expected to cover 2.0 years worth of net outflows after accounting for investment losses in a worse case scenario
- Mixes 1-4 have higher fixed income allocations than the current target and could cover more than 2.3 years of outflows

Summary of Asset-liability Results

Factor	Description
Return Objective	• 7.5% investment return assumption • All asset mixes are expected to achieve 7.5% over the next 30 years
Time Horizon	• Indefinite. Plan is open.
Liquidity Needs	• Liquidity needs are expected (50th) to be manageable • In a worse case scenario, net outflow approaches 10% just before each of the reset points (2028 and 2033) • Very illiquid assets are currently ~19.7% of portfolio – 9.7% in core real estate and 10% in private equity
Contribution Risk	• Rates are “stabilized” over 5 year periods but may experience a large increase/(decrease) at the end of a cycle if actuarial losses/(gains) materially accumulate during the five year stability period
Risk Tolerance	• Risk tolerance is the ability and willingness to take risk • Consider worse case results for funded status, cumulative contributions and ultimate net cost
Liability Growth	• Plan is accruing • Annualized growth is 1.5% per year
Funded Status	• Plan is underfunded • 1/1/2023 Funded status = 76.8%

Appendix

Public Fund Actuarial Discount Rates

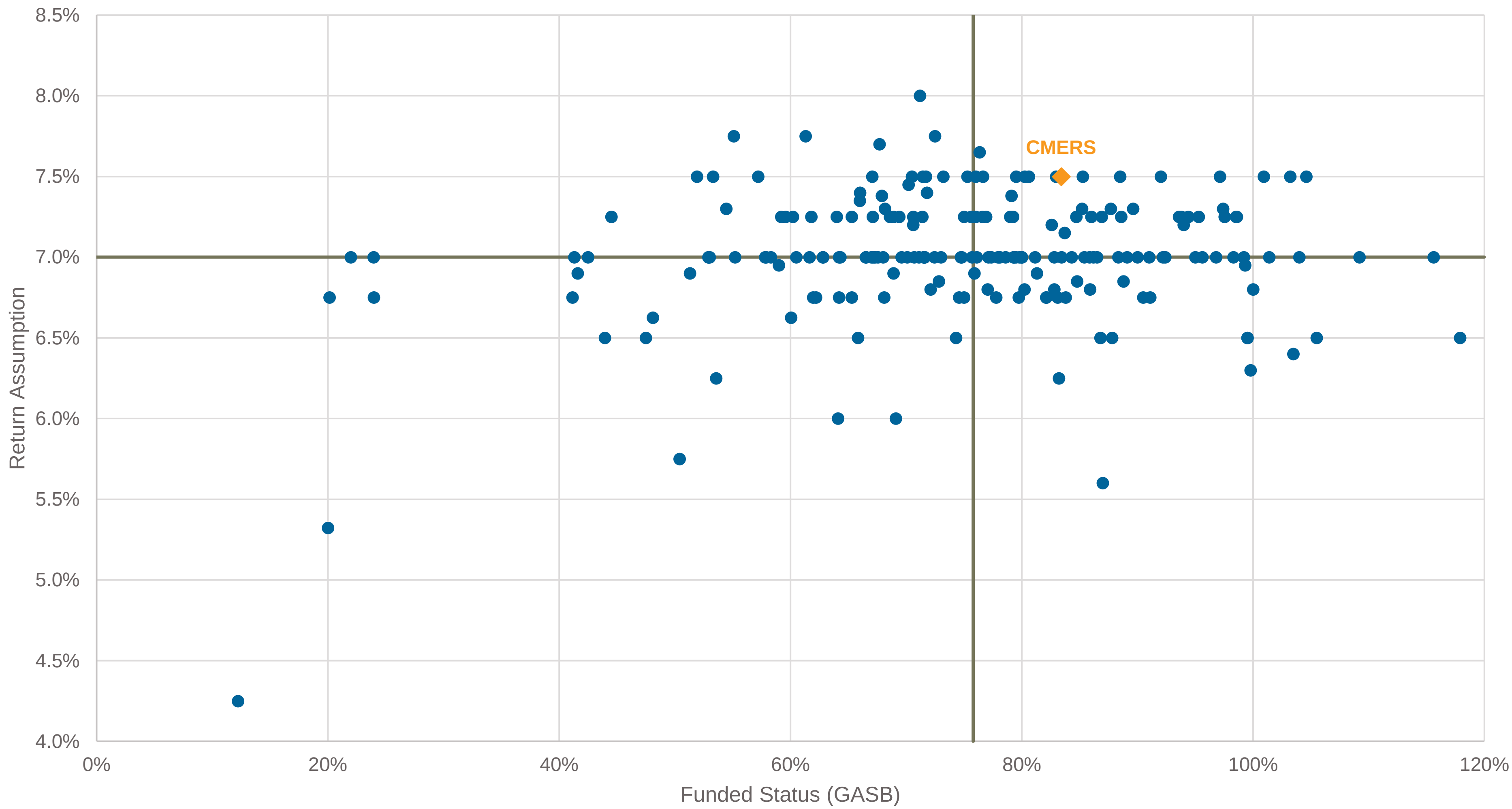


- Industry consensus has trended toward lower return expectations, leading to a steady decline in actuarial discount rates over the last 20 years
- The 2022 median actuarial discount rate is 7.0%
  – The median discount rate may increase in 2023 when the survey is updated. Industry forward-looking return expectations have increased across the board in 2023.

Source: Public Plans Database

Comparison of Funded Status and Return Assumption

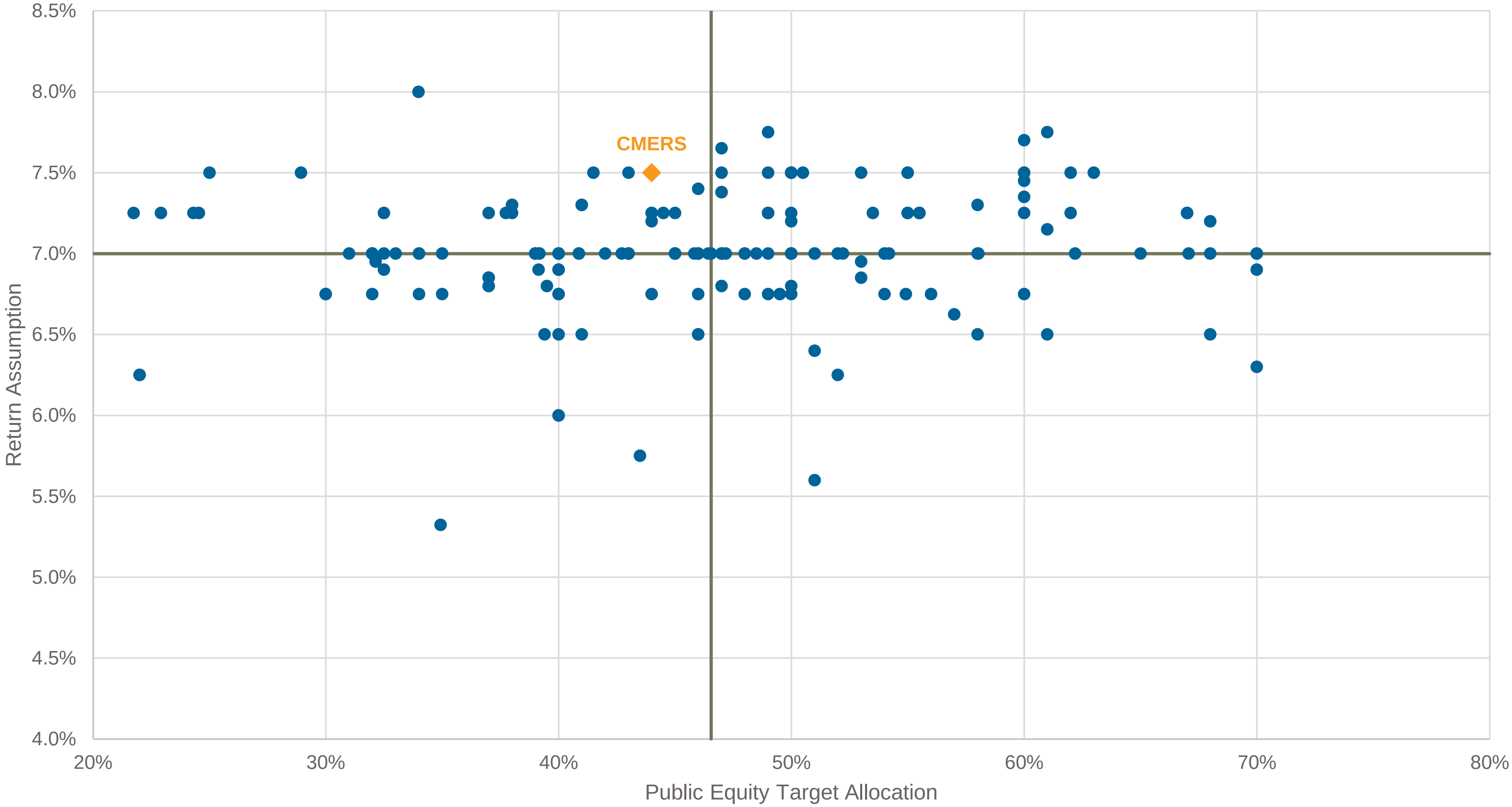
Funded Status vs. Return Assumption
2021 Fiscal Year
Crosshairs Represent Medians



Source: Public Plans Database. 2021 represents the most current data available in the database.

Comparison of Public Equity Target Allocation and Return Assumption

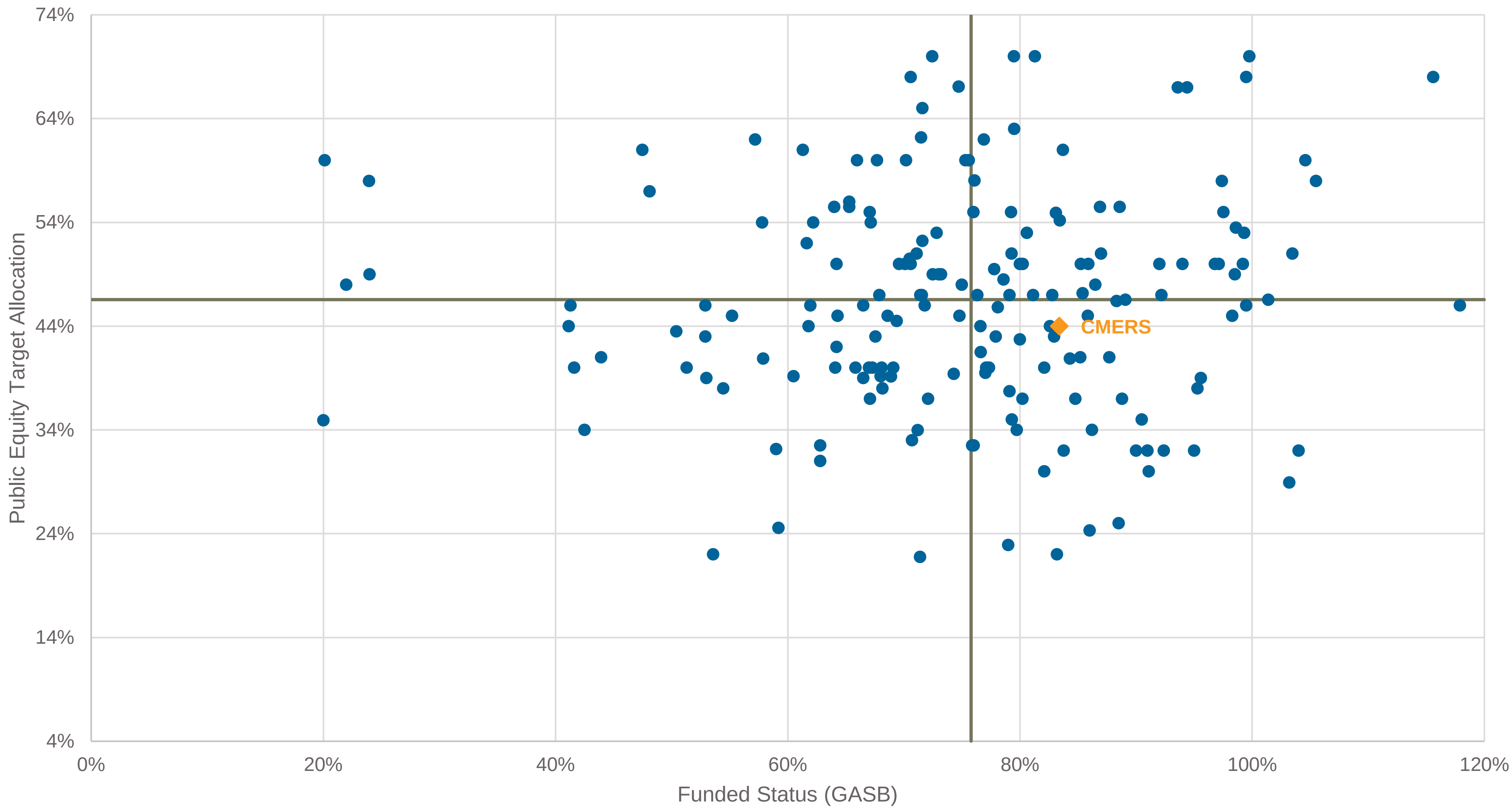
Public Equity Target Allocation vs. Return Assumption
2021 Fiscal Year
Crosshairs Represent Medians



Source: Public Plans Database. 2021 represents the most current data available in the database.

Comparison of Funded Status and Public Equity Target Allocation

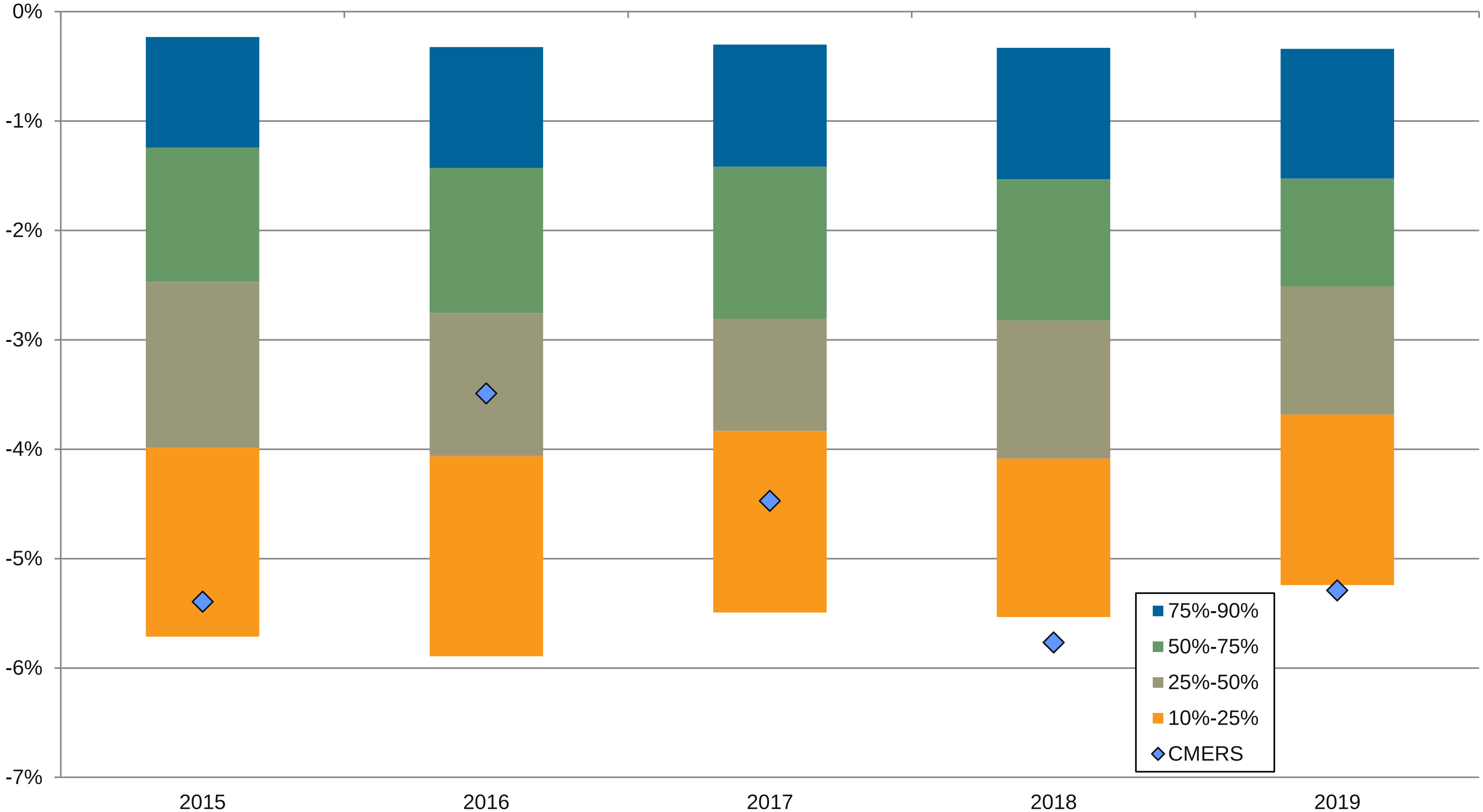
Funded Status vs. Public Equity Target Allocation
2021 Fiscal Year
Crosshairs Represent Medians



Source: Public Plans Database. 2021 represents the most current data available in the database.

Public Fund Net Flows

Range of Net Flows Among Plans by Fiscal Year
Limited Responses for all Plans After 2019



Source: Public Plans Database. Data for all plans was limited after 2019 so we did not include the data after that point.

2023 – 2032 Correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Global Equity	1.00																
2	Large Cap US Equity	0.93	1.00															
3	Small/Mid Cap US Equity	0.93	0.88	1.00														
4	Developed ex-US Equity	0.92	0.73	0.79	1.00													
5	Emerging Market Equity	0.93	0.79	0.83	0.89	1.00												
6	Private Equity	0.84	0.79	0.77	0.76	0.75	1.00											
7	CMERS Fixed Income	0.67	0.64	0.61	0.61	0.60	0.47	1.00										
8	Core US Fixed	0.00	0.02	-0.02	0.00	-0.04	-0.09	0.56	1.00									
9	High Yield	0.80	0.75	0.74	0.73	0.75	0.61	0.88	0.09	1.00								
10	Cash Equivalents	-0.09	-0.06	-0.08	-0.10	-0.10	0.00	0.00	0.15	-0.09	1.00							
11	CMERS RA	0.59	0.58	0.54	0.51	0.52	0.64	0.43	0.16	0.43	-0.01	1.00						
12	Core Real Estate	0.46	0.44	0.42	0.42	0.41	0.55	0.33	0.14	0.31	0.00	0.98	1.00					
13	CMERS Liquid RA	0.88	0.94	0.83	0.69	0.75	0.75	0.68	0.14	0.74	-0.04	0.61	0.46	1.00				
14	TIPS	-0.09	-0.07	-0.08	-0.09	-0.11	-0.11	0.36	0.70	0.02	0.12	0.10	0.09	0.13	1.00			
15	Commodities	0.21	0.20	0.20	0.20	0.20	0.20	0.15	-0.04	0.20	-0.02	0.25	0.18	0.45	0.00	1.00		
16	Hedge Funds	0.70	0.67	0.63	0.63	0.63	0.48	0.64	0.29	0.60	-0.04	0.39	0.28	0.71	0.20	0.23	1.00	
17	Inflation	0.00	-0.02	0.02	0.00	0.03	0.06	-0.11	-0.23	0.00	0.05	0.20	0.20	0.13	0.25	0.35	0.05	1.00

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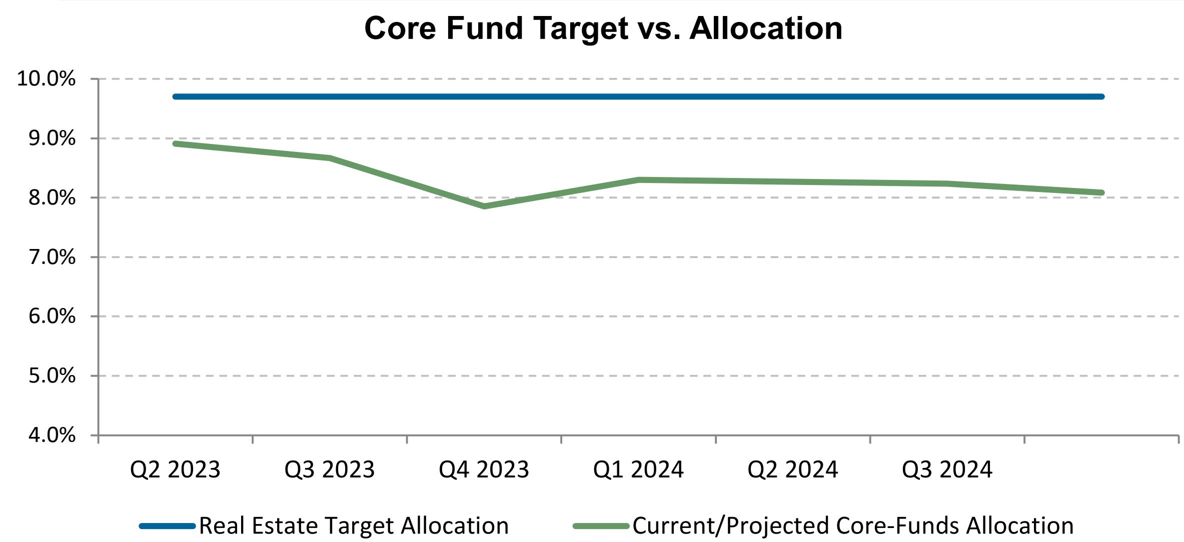
CMERS' Structure Review and New Manager Allocation

CMERS' Portfolio Guidelines/Constraints	
Manager Concentration	<35%
Single Sector	35% to 40%

- Purpose:
  - Maintain compliance with portfolio guidelines
  - Allocate capital to a new Core Fund

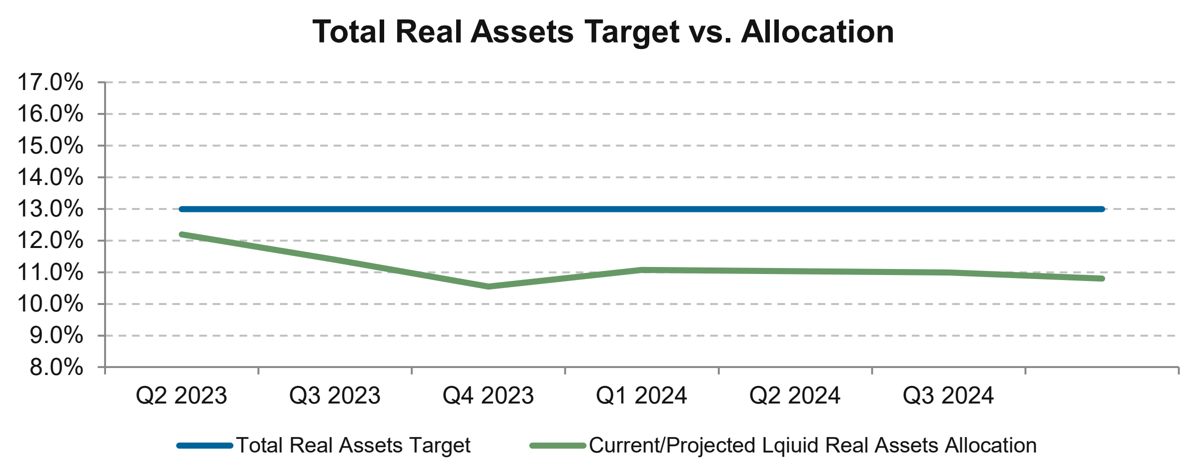
1Q2023 Core Fund Portfolio Allocation vs Target

Assumptions utilized



Callan Growth Rates 10-year Projection	
Total Plan (A/L Return)	5.94%
Core-Real Estate^	PREA (NPI) Forecast
Non-Core - Funds*	Wind Down

PREA (NPI) Forecast	
2023	-5.3%
2024	4.5%
2025	6.4%



- 1Q23 Real Estate allocation is 9.1%
- Total Real Assets is 12.2% (including Liquid Diversified Real Assets 3.0%)

*Non-Core Funds represent <.2% of the portfolio and will be carried at a flat value

^Due to appraisal lag and depreciation occurring in core real estate, Callan Real Assets team utilizes the PREA Forecast when modeling three year or shorter time periods

1Q2023 Core Fund Portfolio Allocation

				Property Type Diversification				
	1Q23	1Q23	1Q23	1Q23	1Q23	1Q23	1Q23
	NAV	% of Portfolio	Office	Multifamily	Retail	Industrial	Other
JPM SPF	**$136,658,727**	**27.5%**	**22.9%**	**26.6%**	**17.3%**	**30.6%**	**2.6%**
MS Prime	**$156,580,219**	**31.1%**	**19.3%**	**25.0%**	**8.3%**	**30.8%**	**16.6%**
LaSalle Property	**$116,731,030**	**23.0%**	**10.0%**	**35.0%**	**11.0%**	**26.0%**	**18.0%**
Prologis Logistics	**$92,055,126**	**18.3%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	**0.0%**
ODCE Value Weight			***20.8%***	***29.3%***	***10.1%***	***31.4%***	***8.4%***
Portfolio Total	$502,025,102		***14.6%***	***23.2%***	***9.9%***	***42.3%***	***10.0%***

- 42% Industrial allocation represents concentration risk and outside the preferred target of (35% - 40%)

4Q2023 Core Fund Portfolio Allocation

	1Q23	4Q23	4Q23	Property Type Diversification			
				4Q23	4Q23	4Q23	4Q23
	Actual Weight	Target Weight	Office	Multifamily	Retail	Industrial	Other
JPM SPF	2.5%	*2.5%*	22.9%	**26.6%**	**17.3%**	**30.6%**	**2.6%**
MS Prime	2.8%	*2.7%*	19.3%	**25.0%**	**8.3%**	**30.8%**	**16.6%**
LaSalle Property	2.1%	*2.3%*	10.0%	**35.0%**	**11.0%**	**26.0%**	**18.0%**
Prologis Logistics	1.6%	*1.3%*	0.0%	**0.0%**	**0.0%**	**100.0%**	**0.0%**
New Fund	0.0%	*0.9%*	0.0%	**0.0%**	**0.0%**	**0.0%**	**100.0%**
ODCE Value Weight			***20.8%***	***29.3%***	***10.1%***	***31.4%***	***8.4%***
Total	8.9%	*9.7%*	***13.7%***	***22.1%***	***9.4%***	***35.9%***	***18.8%***

- Make commitment to new Core Fund
- Projected sector exposure will be within approved guidelines
- Total real estate target may change subject to results of A/L Study