Public Agenda Item #11

Review of ERS' Asset Allocation and Implementation

March 11, 2020

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NEPC 2020 INVESTMENT OUTLOOK

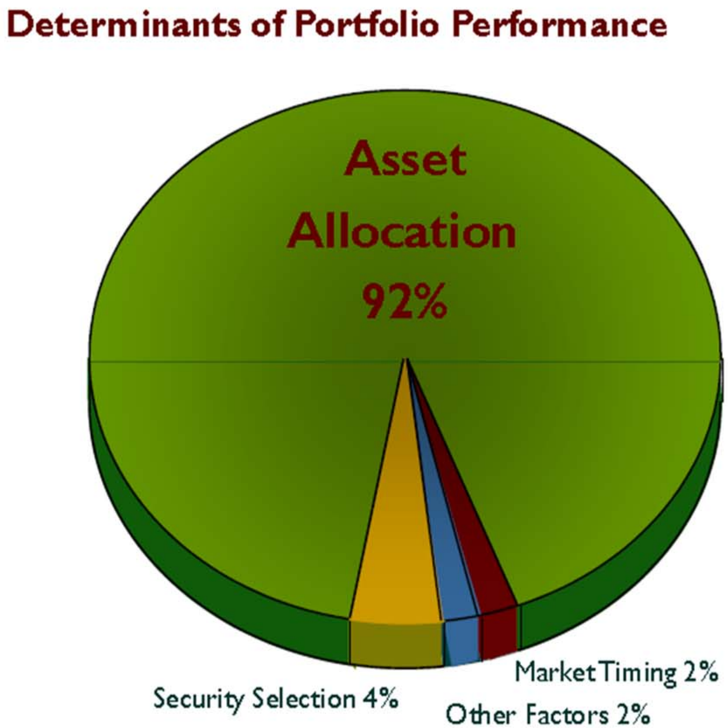
EMPLOYEES RETIREMENT SYSTEM OF TEXAS

BOSTON | ATLANTA | CHARLOTTE | CHICAGO | DETROIT | LAS VEGAS | PORTLAND | SAN FRANCISCO

CURRENT ASSET ALLOCATION POLICY & RANGES

	Long-Term Target	Current Actual Allocation 12/31/2019	Long-Term Target Range	Benchmark
Return Seeking Assets				
Public Equity	37.0%	39.0%	27.0% - 47.0%	MSCI ACWI IMI
Private Equity	13.0%	14.7%	8.0% - 18.0%	Wilshire TUCS Public: Plans > $5 Billion
Global Credit	11.0%	9.6%	1.0% - 21.0%	Barclays US HY 2%
Private Real Estate	9.0%	7.6%	4.0% -14.0%	NCREIF – ODCE
Public Real Estate	3.0%	3.2%	0.0% - 13.0%	FTSE EPRA / NAREIT
Private Infrastructure	7.0%	3.0%	2.0% - 12.0%	CPI + 400 bps
Opportunistic Credit	3.0%	-	0.0% - 8.0%	S&P LSTA Leveraged Loan Index + 1.5%
Risk Assets: Reduction/Liquidity				
Total Rates	11.0%	17.1%	--	Barclays Intermediate Treasury
Absolute Return	5.0%	3.6%	0.0% - 10.0%	3-Month T-bill + 3.5%
Cash	1.0%	1.9%	0.0% - 1.0%	91 Day Treasury bill

ASSET ALLOCATION: THE KEY INVESTMENT DECISION



Source: Determinants of Portfolio Performance II: An Update, Brinson, et al, Financial Analysts Journal, May/June 1991, pp 40-48.

CAPITAL MARKET FORECAST COMPARISON

	Asset Class	Policy Asset Allocation	2019 (5-7 Yr) Return	2019 (5-7 Yr) Risk	2020 (10 Yr) Return	2020 (10 Yr) Risk
Risk Seeking: 79%	Global Equity	37	7.00%	17.60%	6.21%	17.79%
	Private Equity	13	8.80%	19.60%	8.11%	19.66%
	Total Global Equity	**50**	**7.50%**	**17.80%**	**6.67%**	**17.98%**
	Global Credit	**11**	**5.50%**	**11.80%**	**4.45%**	**11.89%**
	Opportunistic Credit	**3**	**6.80%**	**8.70%**	**6.04%**	**9.26%**
	REITs	3	6.80%	20.00%	5.42%	20.00%
	Private Real Assets - Infrastructure/Land	7	6.30%	12.00%	5.91%	12.00%
	Private Real Estate	9	6.70%	14.50%	6.05%	15.87%
	Real Assets	**19**	**6.80%**	**12.30%**	**6.19%**	**12.77%**
Risk Reduction/ Liquidity Assets: 21%	**Fixed Income - Rates**	**11**	**2.50%**	**4.70%**	**1.97%**	**4.65%**
	Absolute Return**	**5**	**6.50%**	**3.60%**	**6.50%**	**3.41%**
	Cash	**1**	**2.50%**	**1.00%**	**1.81%**	**1.00%**

	5 - 7 Year Statistics	10 Yr Statistics
Expected Return (Geometric)	6.68%	6.06%
Standard Deviation (Asset)	12.00%	12.04%
Sharpe Ratio	0.35	0.35

	20 Yr Expected Return	20 Yr Expected Return
20 Year Expected Return	7.51%	6.41%

	30 Yr Expected Return	30 Yr Expected Return
30 Year Expected Return	7.75%	7.14%

	2019 Probabilities	2020 Probabilities
Probability of 1-Year Return Under 0%	28.97%	30.76%
Probability of 1-Year Return Under 7.5%	52.73%	54.77%
Probability of 10-Year Return Under 7.5%	56.65%	64.78%
Probability of 30-Year Return Over 7.5%	45.45%	43.51%

Note: Modeling assumptions are found on the next page
** Sourced from ERS Texas

EXPECTED RETURN COMPARISON 2019 VS 2020

	2019	2020
	5 - 7 Year Statistics	10 Yr Statistics
Expected Return (Geometric)	6.68%	6.06%
Standard Deviation (Asset)	12.00%	12.04%
Sharpe Ratio	0.35	0.35
	20 Yr Expected Return	20 Yr Expected Return
20 Year Expected Return	7.51%	6.41%
	30 Yr Expected Return	30 Yr Expected Return
30 Year Expected Return	7.75%	7.14%
	2019 Probabilities	2020 Probabilities
Probability of 1-Year Return Under 0%	28.97%	30.76%
Probability of 1-Year Return Under 7.5%	52.73%	54.77%
Probability of 10-Year Return Under 7.5%	56.65%	64.78%
Probability of 30-Year Return Over 7.5%	45.45%	43.51%
Probability of 10-Year Return Over 7.0%		40.21%
Probability of 30-Year Return Over 7.0%		52.55%

ASSET MIX SCENARIOS

	Policy Target	Mix 1	Mix 2	Mix 3
Cash	**1%**	**1%**	**1%**	**1%**
Global Public Equity	37%	32.50%	33.00%	35%
Private Equity	13%	17.5%	15.5%	15%
Total Equity	**50%**	**50%**	**49%**	**50%**
Rates	**11%**	**11%**	**11%**	**11%**
High-Yield Bonds	7%	7%	7%	7%
EMD (External)	2%	2%	2%	2%
EMD (Local Currency)	2%	2%	2%	2%
Private RE Debt	1.5%	1.5%	0%	1.5%
Private Debt	1.5%	1.5%	4.5%	1.5%
Credit	**14%**	**14%**	**16%**	**14%**
REITs	3%	3%	3%	3%
Core Real Estate	4%	4%	2%	4%
Non-Core Real Estate	5%	5%	7%	5%
Private Real Assets - Infrastructure/Land	7%	7%	7%	7%
Total Real Assets	**19%**	**19%**	**19%**	**19%**
Absolute Return	**5%**	**5%**	**5%**	**5%**
Expected Return 10 yrs	**6.06%**	**6.43%**	**6.41%**	**6.15%**
Expected Return 30 yrs	**7.14%**	**7.50%**	**7.50%**	**7.25%**
Standard Dev	**12.04%**	**12.92%**	**12.83%**	**12.32%**
Sharpe Ratio (10 years)	**0.35**	**0.36**	**0.36**	**0.35**
Sharpe Ratio (30 years)	**0.40**	**0.40**	**0.40**	**0.40**
Probability of 1-Year Return Under 0%	**30.76%**	**30.94%**	**30.86%**	**30.9%**
Probability of 1-Year Return Under 7.5%	**54.77%**	**53.32%**	**53.38%**	**54.3%**
Probability of 10-Year Return Under 7.5%	**64.78%**	**60.38%**	**60.59%**	**63.5%**
Probability of 30-Year Return Over 7.5%	**43.51%**	**50.08%**	**49.95%**	**54.5%**
Probability of 10-Year Return Over 7.0%	**40.21%**	**44.40%**	**44.22%**	**41.42%**

Note: arrows indicate move up or down vs. Policy Target

MODELING ASSUMPTIONS

- Global Equity is modeled using NEPC Global Equity assumption; uses MSCI ACWI IMI Weights
- Private Equity is modeled using 13% VC, 46% Buyouts, 7% Distressed Debt, 3% Mezzanine, 8% Natural Resources (Infrastructure), 23% Secondaries
- Global Credit is modeled using 7% High Yield, 4% EMD
- Opportunistic Credit is modeled using 1.5% Direct Lending + 1.5% Real Estate Debt
- Private Real Estate is modeled using 42.8% Core RE + 57.2% Non-Core RE. This is derived from the 30/40/30 Core, Non-Core/REIT assumption
- Fixed Income- Rates is modeled using a 5 yr Duration Treasuries assumption
- 2020 Absolute Return uses ERS Texas Absolute Return capital market assumption.
- Unless otherwise stated, the underlying capital market assumption source is constructed using NEPC's 2020 capital market assumptions

INTRODUCTION TO NEPC CAPITAL MARKET ASSUMPTIONS

NEPC, LLC

2020 ASSET CLASS OVERVIEW

2019 was a year of robust returns across most asset classes

Investors were rewarded with lucrative returns as global equities and bonds rallied

Falling global yields were a powerful tailwind

Fixed income benefitted as prices rose with falling yields

The discounting of future cash flows with lower rates, supports higher equity valuations

The economic backdrop weakened globally, but remains net positive

Accommodative monetary policy in the developed world was a positive for risk assets

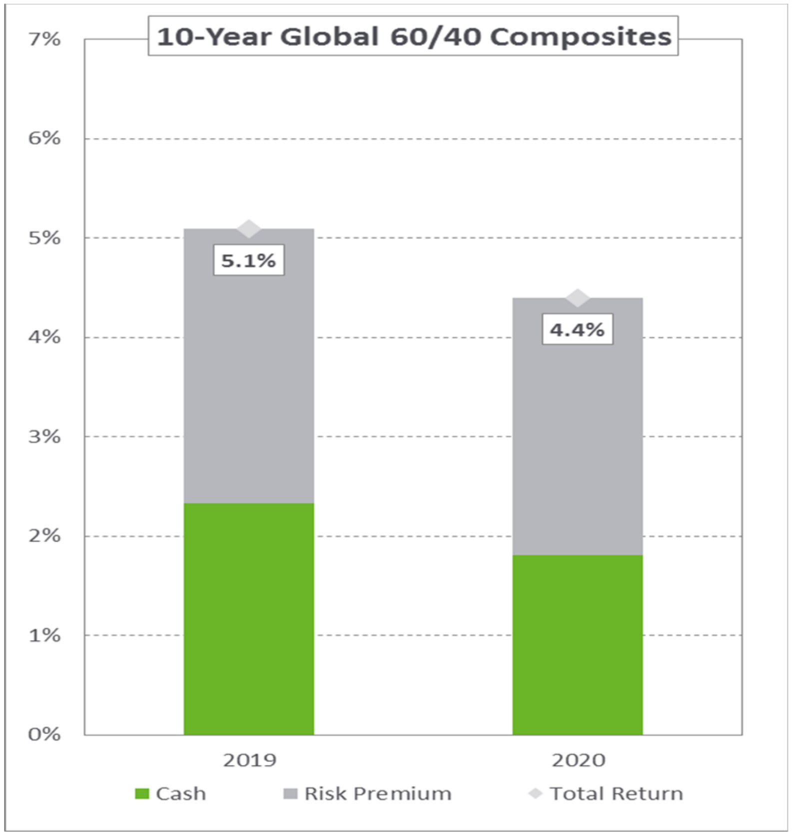
Market-based inflation expectations have declined considerably and reflect a lower expected inflation path over the long-term

The "lower for longer" period has extended out a decade due to central bank intervention

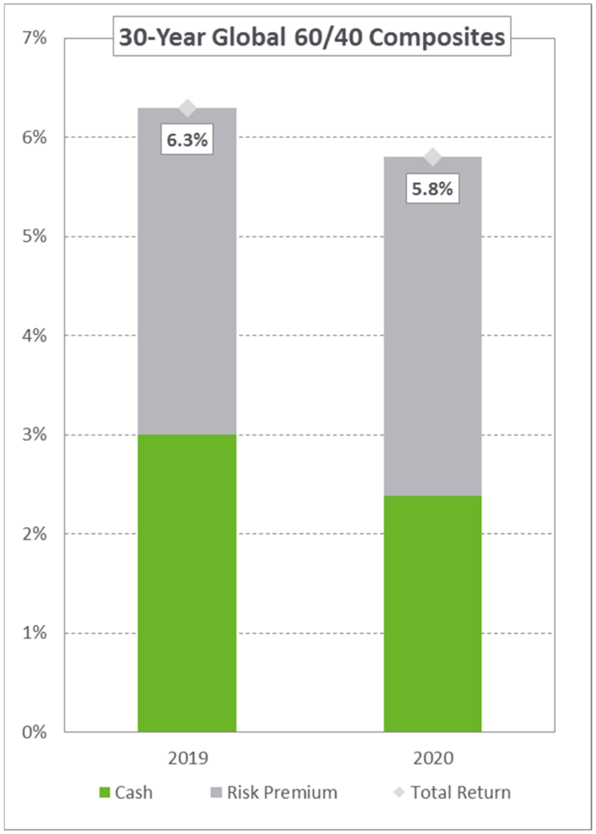
The combination of falling interest rates, robust returns in the prior year, and lower growth and inflation expectations generate declining return expectations for nearly all asset classes

These significant market movements resulted in a secular decline in NEPC's outlook – impacting both the 10-year and 30-year assumptions

THE IMPACT OF LOWER CASH RATES



Source: NEPC



Source: NEPC

FORECAST TIME HORIZON ADJUSTMENT

NEPC has adopted a 10-year return horizon and shifted from a 5-7 year outlook for capital market assumptions

The 5-7 year time horizon was intended to correspond to the approximate length of the market cycle; recent structural changes in the economic environment signal longer cycles

Themes and valuation shifts are likely to play out over a more extended time frame

This adjustment allows clients to more easily reconcile forecasts from multiple sources

The 10-year horizon is representative of a long-term strategic view and should not be conflated with shorter-term market views

Forecasts are influenced by the path of key inputs such as growth, rates, and inflation, as well as terminal values of valuations, spreads, and profit margins

This change in methodology introduces nuances relative to prior years:

The change in assumptions over time should be muted as convergence toward a terminal value is incorporated over a longer time frame

For 2020, 10-year forecasts would be slightly higher than a 5-7 year forecast as capital markets are assumed to normalize over time

The decline in 2020 capital market expectations is predominantly driven by changes from the 2019 market environment rather than longer time horizon

2020 ADDITIONAL ENHANCEMENTS

The Asset Allocation Committee continues to refine the process

The rounding convention for capital market return assumptions have been changed to the nearest 10 basis points

- Historically, return assumptions were rounded to the nearest 25 basis points and this change should not be viewed as a message of increased precision

New asset class assumptions were added to assist in portfolio modeling

- Global Listed Infrastructure, Natural Resource Equities, Short TIPS, and Long TIPS

Adjustments were made to some asset classes to provide a better reflection of the underlying investment beta

- China Equity: Represents all shares, rather than a local-only investment mandate
- Private Debt – Credit Opportunities: Includes investment areas outside of direct lending and distressed debt. The opportunity represents mezzanine and other niche approaches

ASSUMPTION DEVELOPMENT

Capital market assumptions are published for over 65 asset classes

Assumptions include 10-year and 30-year return forecasts, volatility expectations, and correlations

NEPC publishes both 10- and 30-year return forecasts

10-year forecasts are appropriate for strategic asset allocation analysis and are influenced by global forecasts/pricing of growth, inflation, and yields, while valuations and spreads converge to NEPC-defined terminal values

30-year forecasts are appropriate for actuarial inputs and long-term planning

Based on data as of November 30

Assumptions are developed by the Asset Allocation Committee and approved by the Partners Research Committee (PRC)

Assumptions are developed with proprietary valuation models and rely on a core building block methodology

Asset Allocation Committee	
September	Asset Allocation Committee Assumptions Kickoff Finalize List of New Asset Class Assumptions
October	Review Draft of Asset Class Return Assumptions Discuss Outlook with NEPC Research Beta Groups
November	Finalize Volatility and Correlation Assumptions Final Update of Asset Class Models (As of 11/30)
December	Review Model Output and Create Return Assumptions Present Draft to the PRC Publish Assumptions on December 16th

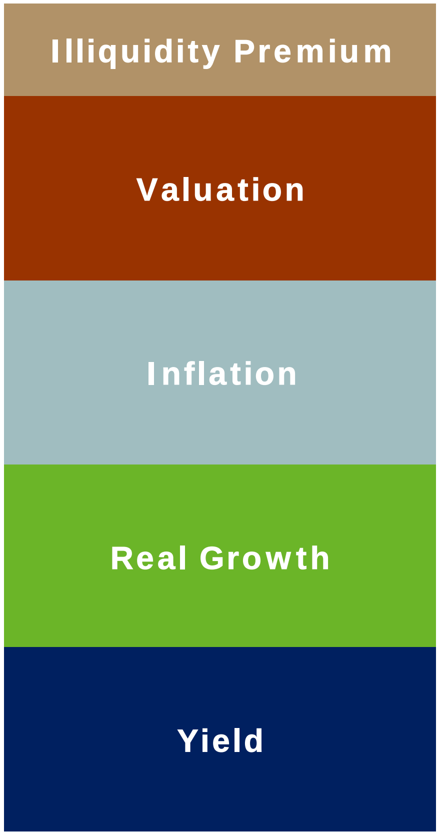
BUILDING BLOCKS METHODOLOGY

Forward-looking asset class models incorporate current and forecasted market and economic data to inform expected returns

Quantitative inputs combined with a conversion to long-term terminal values drive the 10-year outlook

Asset components are aggregated to capture core drivers of return across asset classes – forming the foundation of our building blocks framework

Building block components will differ for equity, fixed income, and real assets



CORE GEOMETRIC RETURN ASSUMPTIONS

	Asset Class	10-Year Return	30-Year Return	Volatility
	Cash	1.8%	2.4%	1.00%
	US Inflation	2.3%	2.5%	-
Equity	Large Cap Equities	5.0%	6.7%	16.50%
Equity	International Equities (Unhedged)	6.0%	7.0%	20.50%
Equity	Emerging International Equities	9.0%	9.2%	28.00%
Equity	*Global Equity**	*6.2%*	*7.5%*	*17.79%*
Equity	*Private Equity**	*9.4%*	*10.7%*	*24.58%*
Fixed Income	Treasuries	1.9%	2.7%	5.50%
Fixed Income	*Core Bonds**	*2.5%*	*3.4%*	*6.01%*
Fixed Income	TIPS	2.2%	2.7%	6.50%
Fixed Income	High Yield Bonds	4.1%	5.6%	12.50%
Fixed Income	*Private Debt**	*6.7%*	*7.8%*	*11.54%*
Real Assets	Commodities	4.0%	4.8%	19.00%
Real Assets	REITs	5.4%	6.5%	20.00%
Real Assets	Core Real Estate	5.2%	6.0%	13.00%
Real Assets	Private Real Assets: Infrastructure/Land	5.9%	6.7%	12.00%
Multi-Asset	*US 60/40**	*4.3%*	5.7%	*10.37%*
Multi-Asset	*Global 60/40**	*4.4%*	5.8%	*11.53%*
Multi-Asset	*Hedge Funds***	*6.50%*	6.50%	3.41%

*Calculated as a blend of other asset classes

** Sourced from ERS Texas

EMPLOYEES RETIREMENT SYSTEM OF TEXAS

LIQUIDITY ANALYSIS

March 2020

NEPC Research

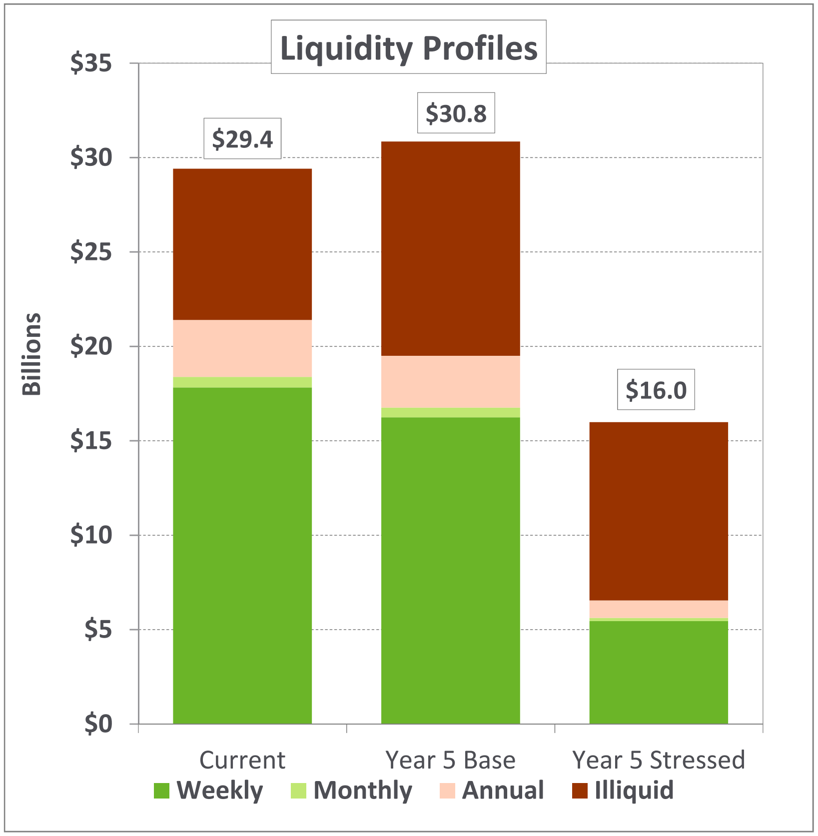
BOSTON | ATLANTA | CHARLOTTE | CHICAGO | DETROIT | LAS VEGAS | PORTLAND | SAN FRANCISCO

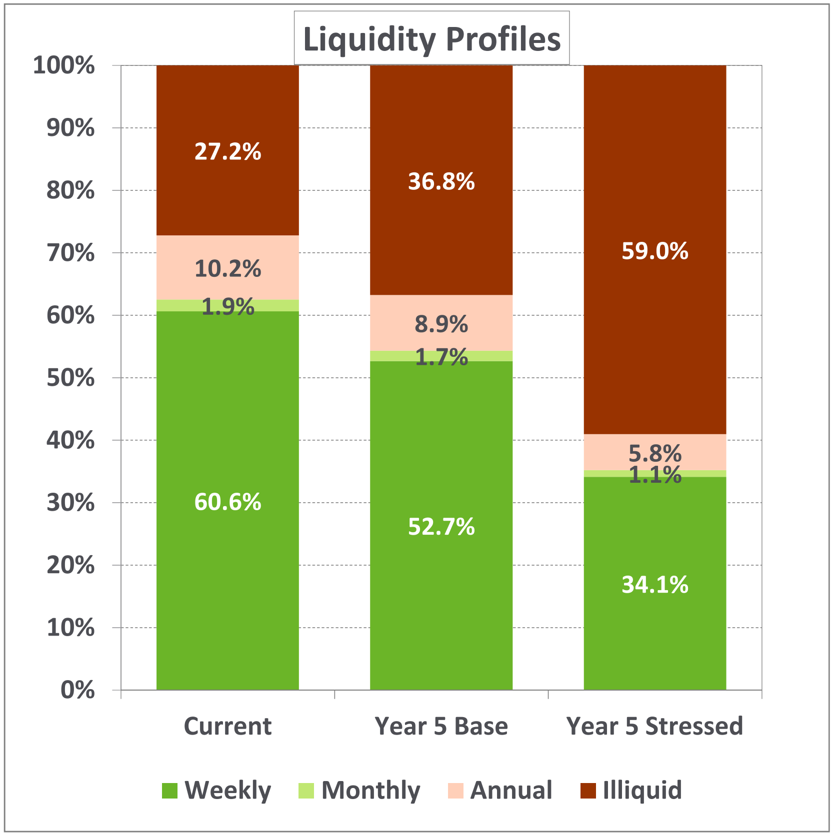
ASSUMPTIONS

- **Base Case**
  - Returns: NEPC 10 year expected returns used
    - Total portfolio expected to return 6.0% per year
  - Benefit Payments and Expenses: based on actuarial projections, averaging $1,427M per year
  - Contributions: based on actuarial projections, averaging $2,910M per year
  - Commitments: based on client's pacing plan
    - Private Equity: averaging $980M per year for the next five years
    - Private Debt: $100M and $150M in the year 2020 and 2021, respectively
    - Private Real Estate: averaging $430M per year for the next five years
    - Private Real Assets: averaging $446M per year for the next five years
  - Capital Calls and Distributions: based on standard industry averages

- **Stressed Case**
  - Returns: 0.0% in Year 1, -18.0% in Year 2 (-2 standard deviations), -6.0% in Year 3 (-1 standard deviation), 6.0% in Year 4 (expected return), and -6.0% in Year 5 (-1 standard deviation)
  - Benefit Payments: Same as base case
  - Contributions: Same as base case
  - Commitments: Same as base case
  - Capital Calls and Distributions: Same as base case except capital calls are doubled in Year 2 and distributions are halved in Year 2 and Year 3

CHANGE IN LIQUIDITY PROFILE





SUMMARY

- **The fund is projected to run net negative cash flows averaging $1.5B per year in the base case**
  - Returns are expected to offset this imbalance, affording some flexibility
  - Private investments are expected to provide returns in excess of public markets
  - Illiquid investments have an attractive diversification profile with a low correlation to other public asset classes

- **While true that some liquid assets must be sold in a stressed environment…**
  - The fund currently has 60.6% of assets with weekly or better liquidity
  - Mature illiquid programs can provide distributions that are additive to liquidity

- **In the base scenario, the fund may benefit from maintaining a diversified allocation to illiquid assets but should exercise caution with future illiquid commitments that may cause liquidity issues in a stressed environment**

Questions?