*Investment Policy Statement*

*of*

*the Commonwealth of Pennsylvania*
*Public School Employees' Retirement Board*

**As adopted by**

**the Board of Trustees**

**on October 25, 2024**

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# I. Introduction

Established on July 18, 1917, with operations commencing in 1919, the Pennsylvania Public School Employees' Retirement System (PSERS or the System,) provides retirement benefits to public school employees of the Commonwealth of Pennsylvania.

## The Board

The members of the PSERS Board of Trustees ("the Board") are vested with and exercise exclusive control and management of the System, including the investment of its assets. The Board appoints staff and retains outside managers, consultants and others as needed to assist it in performing its duties, in accordance with section III of this Policy in which the Board has defined the roles and responsibilities of such parties.

## Mission

To be a partner with our members to fulfill the promise of a secure retirement.

## Fiduciary Standard

Pursuant to the Board's enabling legislation, the members of the Board, employees of the Board, and their agents are fiduciaries to the System's members and beneficiaries and must invest and manage the fund for exclusive benefit of the System's members and beneficiaries. 24 Pa. C. S. §8521(e). As such, they must act consistent with the duty of prudence as well as the duty of loyalty.

In performance of their duties, the trustees shall exercise "that degree of judgment, skill and care under the circumstances then prevailing which persons of prudence, discretion and intelligence who are familiar with such matters exercise in the management of their own affairs not in regard to speculation, but in regard to the permanent disposition of the fund, considering the probable income to be derived therefrom as well as the probable safety of their capital." 24 Pa. C.S. §8521(a).

The System shall at all times be managed in accordance with all applicable state and federal laws, rules, and regulations, as well as this Investment Policy Statement and other applicable policies of the Board.

## II. Purpose

The purpose of this Investment Policy Statement (the "Policy') is to provide clear guidelines for the management of the assets within the PSERS Defined Benefit Fund (the "Fund") by or on behalf of the Board. This Policy establishes policies and guidelines for the investment practices of the Board. The Board shall endeavor to review and revise the Policy annually and make changes as necessary. The Policy outlines objectives, goals, restrictions, and responsibilities to assure that:

1. The Board, Staff, Investment Consultants, Investment Managers, and the State Treasurer clearly understand the objectives and policies of the Board and the System;
2. The Investment Managers shall be given guidance and limitations on the investment of the System's assets; and,
3. The Board has a meaningful basis for evaluating the investment performance of individual Investment Managers, as well as for evaluating overall success in meeting its objectives.

## III. Roles and Responsibilities

The Board establishes roles and responsibilities for PSERS' investment program.

***The Board (Board)***: Based on recommendations of its Investment Committee, the Board, as ultimate governing fiduciary, establishes investment policies and monitors compliance with its policies and progress made towards stated goals. The Board establishes this Policy, including the Asset Allocation, investment performance benchmarks and risk tolerances it contains. The Board also appoints the Chief Investment Officer (CIO), External Managers, and Investment Consultants. The Board monitors the performance of the implementation function it has assigned for effectiveness and compliance with its policies, may direct the CIO, Asset Allocation Committee (AAC), Allocation Implementation Committee (AIC), or the Investment Office Professionals (IOP) to bring matters before them to the Board for its consideration prior to implementation, and will require reporting of the entities identified in this section sufficient to facilitate its fiduciary requirements.

***Chief Investment Officer (CIO):*** The CIO serves as the liaison to The Board and senior staff administrator on all investment matters. The CIO oversees the implementation of Board policies through the management of the IOP, the development and implementation of investment procedures, implementation of tactical allocations within ranges established by the Board, authorization of investment guidelines, execution of investment contracts and other documents, and negotiation of reasonable compensation for investment-related service providers. In overseeing PSERS' investments and the operations related thereto, the CIO must exercise his or her professional skill and prudence in compliance with statutory requirements, prudent investment principles, sound business practices, and all Board policies, including this Policy. The CIO may delegate power and authority to the IOP to effectuate the prudent investment, protection, and management of PSERS' investments. Subject to this policy and the direction of the Board, the CIO shall have responsibility for adhering to the standards set forth by the Board in the management and control of PSERS' investments. In exercising the CIO's duty to act prudently, the CIO may accept or reject the recommendations of the AIC that PSERS appoint or discharge External Managers, forward recommendations to the Board to appoint External Managers or take direct action to discharge them, including for example selling interests in the secondary markets, following prior notification to the Board. The CIO shall assign, modify, or discontinue the guidelines or strategies assigned to any Investment Manager, based on his or her prudent judgment and subject to contrary specific direction from the Board. The CIO shall make regular reports to the Board and provide full transparency to the Board with respect to investment activities. All IOP are accountable to the CIO. The CIO is responsible for all IOP actions relative to the management of PSERS' investments. In this regard, it is the responsibility of the CIO to be satisfied that all investment policies and directives of the Board are implemented.

***Asset Allocation Committee (AAC):*** The AAC recommends to the CIO strategic asset allocation plans, new asset classes and benchmarks, and closely manages actual asset allocations. The AAC shall adopt procedures and maintain meeting minutes. The CIO shall choose the Committee Chair (or Co-Chairs), and the Committee Chair (or Co-Chairs) shall choose the members of the Committee with representation from Private Investments, Public Investments, Operations, and Risk Management & Compliance. The CIO shall be an observer, not a voting member.

***Allocation Implementation Committee (AIC):*** The AIC closely monitors the performance of Investment Managers and the due diligence and analysis it receives from Investment Consultants or other sources. The AIC recommends to the CIO that PSERS appoint or discharge External Managers and the assignment, modification, or discontinuance of guidelines or strategies assigned to any Investment Manager. The AIC shall adopt procedures and maintain meeting minutes. The CIO shall choose the Committee Chair (or Co-Chairs), and the Committee Chair (or Co-Chairs) shall choose the members of the Committee with representation from Private Investments, Public Investments, Operations, and Risk Management & Compliance. The CIO shall be an observer, not a voting member.

***Investment Office Professionals (IOP):*** The IOP assists the CIO, AAC, and AIC in execution of their duties and the management of the System's investment program on a day-to-day basis in accordance with Board policies. The IOP assists the CIO in the development, implementation, and monitoring of the asset allocation policy, the assessment of Investment Manager compliance with applicable policies, guidelines, and contracts, the monitoring of the performance of Other Entities Supporting the Investment Program, the making of direct investments subject to strict compliance with Board policies, the performance of risk management functions, the provision of recommendations relating to AIC Investment Manager selection and discharge, and the administration of ancillary investment programs such as Securities Lending and Proxy Voting. The IOP also assists the CIO by performing operational tasks supporting these investment functions, including custodian bank relationship management, investment office technology administration, trade settlement, portfolio manager support and portfolio accounting, as appropriate.

***Investment Consultants***: The Board shall select and retain third-party Investment Consultants to assist it, the CIO, and the IOP by providing analysis and due diligence, advice and recommendations, education, and commentary. Investment Consultants shall report on performance, compliance, and business matters as required by PSERS, and serve as fiduciaries. Other specific responsibilities shall be set forth in the Investment Consultants' respective contracts.

***Investment Managers***: Subject to strict compliance with PSERS' policies, guidelines, mandates, and standards of care assigned to them, and the terms of applicable contracts, Investment Managers are assigned authority to invest and manage the specific allocations assigned to them, and shall report on performance, compliance, and business matters as required by PSERS.

***Other Entities Supporting the Investment Program:*** The State Treasurer is the legal custodian of not only the System's assets but also those of the entire Commonwealth. The State Treasurer has subcontracted the custodian function to the Custodian Bank for the Commonwealth, including the System. The Custodian Bank holds all cash and securities (except for those held in partnerships, commingled funds, mutual funds, etc.), and regularly accounts for these holdings to the System. Other offices within PSERS, including the Offices of Financial Management and Office of Chief Counsel, as well as the Internal Audit Office, shall also support PSERS' investment processes as assigned. IOP may select and retain other entities to provide investment-related services.

## IV. Investment Objectives

The Investment Objectives are:

- to generate returns to support the System's actuarial soundness so it may provide its members with benefits as required by law.
- to earn a long-term total return, net of fees and investment expenses and administrative expenses, that equals or exceeds the Actuarial Assumed Rate approved by the Board.
- to earn a long-term total return, net of fees and investment expenses, that equals or exceeds the Policy Index approved by the Board.
- to prudently manage investment risks that are related to the achievement of investment goals.

## V. Investment Philosophy

The PSERS Board of Trustees believes PSERS' assets should be managed in accordance with PSERS' unique liability stream, funding sources, cash flows, and portfolio size, focusing on the prudent accumulation of wealth over the long term to meet the retirement benefit obligations established by the plan sponsor to its members.

PSERS' assets should be managed based on the following beliefs:

1. Uncertainty
   - The future is difficult to forecast with any accuracy or certainty, particularly changes in the economic and market environment.

2. Asset Allocation
   - The strategic asset allocation mix, more than implementation or any other factor or decision, largely determines the portfolio's overall risk and return.

3. Diversification
   - Diversification is the best approach to addressing future uncertainty and therefore meeting PSERS' long-term investment objectives.
   - Diversification should be across multiple dimensions:
     - By and within asset classes.
     - By geography.
     - By strategy (e.g., in Public Equity: growth and value, concentrated and diversified, quantitative and fundamental).
     - By vintage year for Private Investments (investment pacing in and out of investments helps mitigate the impact of market volatility).
   - Over any given period, any number of asset classes, geographies, strategies, and vintages will underperform others; that is to be expected and accepted.

4. Risk
   - For an underfunded plan or for a plan with negative cash flow (benefits paid exceed contributions received), the path of compounding of investment returns – from month to month, quarter to quarter, and year to year -- matters more than for a plan that is fully funded or has positive cash flow; for the former type of plan, peak-to-trough declines transform unrealized losses into permanent ones.
   - Drawdown risk should be mitigated, especially as the environment in which drawdowns occur is likely also the environment where the Plan Sponsor's willingness and ability to make contributions to the plan may be less than in normal times.
   - Liquidity should be managed to reasonably ensure that the fund can meet its obligations during periods of market dislocations.

5. Leverage
   - Leverage at the total fund level can be an effective tool to enhance diversification, since asset classes, over the long-term, have similar risk-adjusted returns, different correlations to each other, and different responses to changes in the economic and market environment.
   - Leverage can be a vital tool to increase or decrease total fund risk in a diversified manner.

6. Rebalancing
   - Disciplined rebalancing enhances long term returns as it is an inherently contrarian process.
   - Rebalancing restores strategic asset allocation as the primary driver of return and risk.

7. Portfolio Size
   - Managing a large pool of assets provides investors unique access to investment opportunities not available to smaller institutional investors or individual investors.
   - PSERS should use its size to its advantage to enhance its net-of-fees return and diversification opportunities.

8. Private Investments
   - Allocations to Private Equity, Private Credit, Private Real Estate, Private Infrastructure, and other illiquid asset classes may be justified by the illiquidity risk premium available to investors.
   - Allocations to these asset classes may also be justified by the diversification benefit they provide, through exposure to sectors, businesses, and mode of corporate governance not obtainable through public markets.

9. Active Management
   - Passive investing, rather than active management, is the default choice to be used for any asset class that is highly efficient or where skilled active managers are less likely to be identified.
   - Certain asset classes continue to exhibit information inefficiency, where skilled active management and well-resourced investors such as PSERS can potentially persistently outperform peers and the benchmark for that asset class.
   - There will be short-term periods when a skilled active manager may underperform peers and the benchmark; that is to be expected and accepted; therefore a long-term perspective will be employed.

10. Internal Management
    - PSERS has developed skilled internal investment managers; as such internal investment management is preferred over external investment management in cases where internal management most likely can match or exceed the long term, net of fees, risk-adjusted returns provided by External Managers, provided the internal investment and operational resources are available to do so.

11. Investment Fees
    - Investment management fees for external management are one of the few aspects of investment management that are certain and over which the investor has control.
    - Investment management and performance fees should be managed to (i) maximize long term, net of fees, risk-adjusted returns, (ii) split the value added fairly between the Investment Manager and PSERS, and (iii) align the interests of Investment Manager with PSERS.

## VI. Asset Allocation

### A. Purpose

The asset allocation establishes a framework for PSERS that has a reasonable likelihood, in the judgment of the Board, of realizing PSERS' long-term investment objectives.

In establishing the asset allocation for the System, the Board considers capital market expectations for expected return, volatility, and asset class correlations as discussed below.

### B. Capital Market Assumptions

Capital Market Assumptions (CMAs) are estimates of expected returns and risks for a given set of asset classes, and expectations of the relationship (correlations) between these asset classes over long periods of time. They are issued periodically by investment consultants, asset managers, and investment banks. Inflation, real short-term interest rates, and economic data frequently provide the foundation used by CMAs for expected returns across global asset classes. These are the primary building blocks for developing equity and fixed income returns expectations, which in turn are used in setting expectations for alternative asset class returns. PSERS collects and evaluates this information when considering its long-term actuarial rates of return assumptions and in setting its Asset Allocation. For Asset Allocation purposes, the Board will generally use CMAs prepared by the Board's general Investment Consultant.

### C. Targets and Ranges

The Board sets target allocations ("Targets") to various asset classes that are designed to meet PSERS' long-term investment objectives and establishes a band of minimum and maximum allowable allocations, or ranges ("Ranges"), surrounding each Asset Class Target Allocation. The purpose of Ranges is to allow flexibility to adapt to changing market conditions and to cost-effectively balance the Board's Investment Policy with the investment strategies pursued over shorter time periods. The table below sets forth Targets and Ranges for each Asset Class and sub-asset class. Allocations are in the form of Economic Exposure, which includes Asset Allocation Leverage as defined in the Leverage Policy.

## ASSET ALLOCATION
### (Effective December 1, 2024)

| ASSET CLASS | TARGET ALLOCATION | RANGE |
|---|---|---|
| **Equity Exposure** | **44.00%** | +/- 5% |
| **Public Equity** | **32.00%** | +/- 5% |
| U.S. Equity | 20.00% | +/- 5% |
| Non-U.S. Equity | 12.00% | +/- 5% |
| **Private Equity** | **12.00%** | +/- 4% |
| **Fixed Income Exposure** | **34.00%** | +/- 5% |
| **Public Fixed Income** | **27.00%** | +/- 5% |
| Investment Grade | 16.00% | +/- 5% |
| Credit-Related | 4.00% | +/- 3% |
| Inflation Protected | 7.00% | +/- 5% |
| **Private Fixed Income** | **7.00%** | |
| Private Credit | 7.00% | +/- 2% |
| **Real Asset Exposure** | **22.00%** | +/- 5% |
| **Public Real Assets** | **11.00%** | +/- 3% |
| Infrastructure | 5.00% | +/- 3% |
| Commodities | 4.00% | +/- 3% |
| Real Estate | 2.00% | +/- 3% |
| **Private Real Assets** | **11.00%** | +/- 3% |
| Infrastructure | 5.00% | +/- 3% |
| Real Estate | 6.00% | +/- 2% |
| **Opportunistic** | **0.00%** | 0% - 5% |
| **Net Leverage** | **0.00%** | 10 to -10% |
| **Cash** | 4.50% | |
| **Explicit Leverage** | -4.50% | |
| | **100.00%** | |

In setting Ranges, the following principles are applied and will be updated upon the adoption of the next Asset Allocation:

- The Public Equity allocation has a symmetrical Range equivalent to 16% of its Target rounded to a whole percentage point. U.S. and Non-U.S. ranges were set at 100% of the band set for the Public Equity allocation.

- The Public Fixed Income allocation has a symmetrical Range equivalent to 18% of its Target rounded to the whole percentage point. The Investment Grade and Inflation-linked sub-asset classes Ranges were set at 100% of the band set for the Public Fixed Income Target allocations. The Credit-Related allocation was given a Range of +/- 3%.
- The Public Real Assets allocation has a symmetrical Range equivalent to 20% of its Target rounded to a whole percentage point. The Public Infrastructure, Public Commodities, and Public Real Estate sub-asset classes Ranges were set at 100% of the band set for the Public Real Assets Target allocations.
- The Private Equity, Private Credit, Private Real Assets and Private Real Estate asset classes, each with a significant illiquid component, have a symmetrical Range of 30% from its Target allocation, rounded to a whole percentage point. The Ranges for these asset classes are given wider symmetrical ranges to reflect the dominant influence of public market fluctuations on their proportion. Given the low allocation, the Private Infrastructure allocation has a symmetrical Range of 60% from its Target allocation, rounded to a whole percentage point.
- The Range for the Absolute Return asset class reflects a lower bound of zero and an upper bound of 5%, with no target to allow for the potential of being overweight, for various reasons, during the liquidation.
- The Net Leverage Range has a Range of 10%, which allows for removal of Leverage and accumulation of a position in Cash, to –-10%, which allows for additional Economic Exposure through usage of Asset Allocation Leverage (as defined in the Leverage Policy). Leverage may be deployed across any asset class in the portfolio where it is prudent to do so, based on efficient use of leverage within the constraints of the Policy Range and maximum net leverage permissible under this Policy.
- The Range for Total Equity, Total Fixed Income, and Total Real Asset Exposures will be a symmetrical 5% for each broad asset class which includes exposure to public and private asset classes. These Ranges provide overall limits to these exposures while providing flexibility to accommodate wider market swings.
- For purposes of this analysis, and with the exception of Explicitly Levered Portfolios, as defined in the Leverage Policy, cash and cash equivalents held in each Investment Manager's portfolio will be considered fully invested based on that advisor's objectives (i.e. cash in an equity Investment Manager's account will be considered as part of Public Equity in the table above).

- The Target Allocation for Public and Private Equity, Infrastructure, and Real Estate, and for Private Credit and Public High Yield are adjusted in accordance with the applicable footnote in the Asset Class and Policy Benchmark section below.

## D. Rebalancing

IOP will ensure conformance with the asset allocation set by the Board through monthly, or more frequent, review. In conducting rebalancing activities, the Board expects IOP to operate under the following principles:

- IOP must initiate rebalancing transactions to bring all percentages to values inside the Ranges or promptly seek Board approval to remain outside the Ranges.
- To implement the investment strategy, IOP will manage the asset allocation nearer to or away from the Targets, but within Policy Ranges. Quarterly performance reports to the Board will also reflect actual allocations and variances from Targets.
- The spirit of this Policy is to implement the investment strategy within the Targets and asset allocation Ranges at a reasonable cost, recognizing that overly precise management of asset exposures can result in transaction costs that are not economically justified.

## E. Periodic Review

The Board establishes the Asset Allocation Targets and Ranges and reviews them annually. The Board will undertake a comprehensive strategic asset/liability review designed to assess the continuing appropriateness of this Policy at least every three years or when material changes to the liabilities take place (e.g., plan design changes, material changes in underlying assumptions, etc.). Such review will consider an asset-liability study of future benefit payments, liabilities, required funding, the appropriateness of the actuarial interest rate assumption and the prospective funded status of liabilities. It may also include a study of portfolio design for optimal diversification and comparisons with peer practices.

## VII. Performance Objectives

The performance objectives are to: (1) exceed the return of the Policy Index, net of fees and investment expenses; and (2) exceed the actuarial rate (currently 7.00%), net of fees and investment expenses, over a reasonably longer time horizon. The Policy benchmark combines designated market indices for Asset Classes, weighted by asset allocation Targets. The table below contains the benchmark indices, and weights, for the respective asset classes.

During periods of transition resulting from a change in the Board-approved Targets, the interim target asset allocation and associated benchmarks used to calculate benchmark performance will be established on a quarterly basis in advance of the subsequent quarter. That target mix will be based on allocations made by the CIO and reported to the Board through quarterly performance reports.

### Asset Class and Policy Benchmarks

Each Asset Class shall be measured relative to its designated benchmark index. It is expected that the active management of individual Asset Classes, if any, will provide an investment return in excess of the index, net of expenses.

The Board adopts the following Asset Class Performance Benchmarks and weighted policy benchmarks, cumulatively the Policy Index, for the Asset Allocation Target Allocation to measure the performance of the System subject to footnote 1:

## POLICY BENCHMARK
## (Effective December 1, 2024)

| | Policy Weight | |
|---|---|---|
| **Equity Exposure** | **44.00%** | |
| **Public Equity** | **32.00%** | |
| S&P 1500 TR Index | 20.00% | 1 |
| MSCI ACWI ex USA IMI Net TR Index (Developed Market Currencies 50% Hedged to USD) | 12.00% | 1 |
| **Private Equity** | **12.00%** | |
| Burgiss TR, one-quarter lagged[2] | 12.00% | 1 |
| **Fixed Income Exposure** | **34.00%** | |
| **Public Fixed Income** | **27.00%** | |
| **Investment Grade** | | |
| Bloomberg US Aggregate Bond TR Index | 8.00% | |
| Bloomberg U.S. Long Treasury TR Index | 8.00% | |
| **Credit-Related** | | |
| Bloomberg US Corporate High Yield Bond Index | 4.00% | 1 |
| **Inflation Protected** | | |
| Bloomberg US Government Inflation-Linked Bond All Maturities TR Index | 7.00% | |
| **Private Fixed Income** | **7.00%** | |
| **Credit-Related** | | |
| S&P LSTA Leveraged Loan TR Index + 200bps, one-quarter lagged | 7.00% | 1 |
| **Real Asset Exposure** | **22.00%** | |
| **Public Real Assets** | **11.00%** | |
| **Infrastructure** | | |
| FTSE Developed Core Infrastructure 50/50 Net TR Index (Hedged to USD) | 5.00% | 1 |
| **Commodities** | | |
| Bloomberg Commodity TR Index | 4.00% | |
| **Real Estate** | | |
| FTSE EPRA/NAREIT Developed, Net TR Index (Hedged to USD) | 2.00% | 1 |
| **Private Real Assets** | **11.00%** | |
| **Infrastructure** | | |
| FTSE Developed Core Infrastructure 50/50 Net TR Index (Hedged to USD), one-quarter lagged | 5.00% | 1 |
| **Real Estate** | | |
| NFI and Burgiss TR, one-quarter lagged[3] | 6.00% | 1 |
| **Opportunistic** | **0.00%** | |

| | |
|---|---|
| **Net Leverage** | **0.00%** |
| **Cash** | |
| ICE BofAML 0-3 Month US Treasury Bill Index | 4.50% |
| **Financing Cost of Leverage**[4] | |
| 3-Month Term SOFR | -4.50% |
| | |
| **TOTAL** | **100.00%** |

Footnotes to New Asset Allocation Policy benchmark:

[1] Toggle Feature: As the following Private asset classes economic exposure increases/decreases (e.g. due to fundings/distributions and/or the allocation increases/decreases due to total economic exposure of the Fund changing), the corresponding Public asset class policy weight will be proportionately and conversely revised to reflect these changes. Adjustments to the policy weight will be completed in 50 basis point increments (adjustment will be made to the nearest 0.50%) on a quarterly basis. For example, if the economic exposure to Private Real Estate increases by 100 basis points due to a change in the market value of the total Fund in the fourth quarter, then starting with the first quarter the policy weight will include this 100 basis points increase in the Private Real Estate benchmark and the Publicly-traded Real Estate policy weight will be proportionately reduced by 100 basis points.

| **Private Asset Class** | **Corresponding Public Asset Class** |
| --- | --- |
| Private Equity | Public Equity |
| Private Credit | U.S. Corporate High Yield Bond |
| Private Infrastructure | Public Infrastructure |
| Private Real Estate | Public Real Estate |

[2] The benchmark returns are calculated using the rolling 5-year (20 quarters) total returns obtained from Burgiss Private IQ relevant universe (i.e. Generalist, Expansion Capital, Buyout, Debt, Infrastructure, Natural Resources, Secondary Fund of Funds, and North America-focused Venture Capital).

[3] PSERS weights each of the real estate investment strategies actual net asset values of the System's private real estate investments quarterly to produce a customized, blended benchmark return. The NFI-ODCE (NCREIF Open-end Diversified Core Equity) is used for the core strategy whereas returns for value-added and opportunistic strategies are calculated using the total returns obtained from Burgiss Private IQ. This provides a single blended Real Estate policy benchmark return for the System.

[4] Financing Cost of Leverage represents the amount of leverage embedded in the asset allocation. Financing may be deployed across any asset class in the portfolio where it is prudent to do so, based on efficient use of leverage within the constraints of the policy range and maximum net leverage permissible under this Policy.

## VIII. Risk Management

The Board ensures adequate risk control through the following means:

### A. Diversification

Investments shall be diversified to minimize the impact of the loss from individual investments. In addition to achieving diversification by asset class, careful attention shall be paid to diversification within each asset class and sub- allocation and across managers.

### B. Liquidity

Liquidity is carefully managed through adherence to the Liquidity Policy.

### C. Portfolio Guidelines

Public market separate account portfolios shall operate under written guidelines and governing documents approved by CIO and the Investment Manager that are designed to ensure the portfolio pursues its return objective within the acceptable risk parameters. Other portfolios shall operate pursuant to their governing documents.

### D. Risk Parameters

The CIO, in conjunction with the general Investment Consultant, shall recommend active risk (risk of achieving performance different than the Policy benchmark) parameters to the Board. The Board shall approve active risk parameters as part of PSERS' annual asset allocation review. Risk management reports shall be provided periodically to the Board.

## E. Risk Benchmarks

The benchmarks, including weightings and excluding additional performance goals (e.g. +100bps), adopted by the Board in the Asset Class and Policy Benchmarks section above are used as a framework for risk measurement. While Private Asset Classes do not easily lend themselves to public quantitative measures of risk, such as standard deviation and benchmark tracking error, the use of the following benchmarks for these asset classes is adopted by the Board to provide additional insights into the risks within these asset classes.

| | |
|---|---|
| **Private Equity** | MSCI USA Small Cap TR Index (70%), MSCI ACWI ex USA Small Cap Net TR Index (30%) |
| **Private Credit** | S&P LSTA Leveraged Loan TR Index |
| **Private Infrastructure** | FTSE Developed Core Infrastructure 50/50 Net TR Index (Hedged to USD) |
| **Private Real Estate** | FTSE NAREIT Composite TR Index (90%), FTSE EPRA/NAREIT Developed ex US TR Index (Hedged to USD) (10%) |

## F. Stand-alone Policies

In addition to this Policy, the Board is responsible for reviewing and approving the following stand-alone policies. These Policies are organized into three categories: (1) Asset Class Policies, (2) Investment-Wide Policies and (3) Proxy Voting Policy. Asset Class and Investment-Wide Policies are investment-related Policies, while Proxy Voting Policy relates to governance matters. Asset Class Policies include asset classes within the Asset Allocation, whereas Investment-Wide Policies include information that typically applies to the Fund as a whole.

**Asset Class Policies**

- Public Markets Asset Class Policy
- Private Markets Asset Class Policy
- External Manager Due Diligence and Monitoring Policy

**Investment-Wide Policies**

- Liquidity Policy
- Derivatives and Leverage Policy
- Currency Hedging Policy
- Plaement Agent Policy
- Qualified Independent Representative (QIR) Policy
- External Investment Managers' Insurance Policy
- Tail Risk Mitigation Strategy Policy
- Securities Lending Policy

**Proxy Voting Policy**

- Corporate Governance Focused Thematic Voting Policy

## IX. Monitoring and Reporting

Through the mechanisms described in this section, the Board, via its Investment Committee, receives information necessary to fulfill its fiduciary responsibility of monitoring and overseeing the investment program. The Board's oversight of PSERS' investment program can be considered through a waterfall structure, from high level to the more detailed, and more frequent, degree. Updates and analysis reports are received as formal presentations to the Investment Committee or provided via the Board's intranet site (the Board's governance platform). The following reflects the frequency and detail of the information reported to the Board by IOP unless otherwise noted:

At least once every five years the Investment Committee reviews the performance of Investment Consultants through the contracting process.

At least once every three years, or more frequently as needed, the Investment Committee is provided the following information and analysis:

- The strategic Asset Allocation, including an asset/liability study and the recommended investment structure and Policy Benchmarks, presented by the general Investment Consultant.

On an annual basis the Investment Committee is provided the following information and analysis:

- Investment-related stress testing and liquidity analyses of the strategic Asset Allocation prepared and presented by the general Investment Consultant.
- A detailed review of each Asset Class.
- An annual Investment Expense Report.
- A detailed review of the Securities Lending Program.

Also, on an annual basis, the Corporate Governance Committee is provided analysis on proxy voting matters necessary to update PSERS' Proxy Policies.

Bi-annually

- Report comparing the asset allocation to peers

On a quarterly basis the Investment Committee is provided the following information and analysis:

- Fund and Policy Index performance.
- Current Asset Class tactical allocations.
- Assets managed internally vs. externally by Asset Class.
- A comprehensive performance report for the Asset Classes, including investment managers within each Asset Class, that contains the benchmarked performance as defined within the Performance Benchmark

section as prepared by the general Investment Consultant, via the Board's governance platform.

- A presentation of the general Investment Consultant's review of PSERS' total fund investment performance, via the Board's governance platform.
- And exposure reports and presentations for Private Equity, Private Real Estate, Private Infrastructure, Private Commodities and Private Credit by IOP and specialty Investment Consultants for the Private Investments, via the Board's governance platform.
- Asset Allocation Leverage report
- Moneyline Report that presents the month-end Asset Allocation of the System as compared to the Asset Allocation plan targets approved by the Board.

On a monthly basis, the Board is provided via the Board's governance platform:

- Cash Liquidity reports which include current and forecasted cash, the liquidity profile of the fund, subscription line exposure (updated quarterly), and unfunded commitments.
- Allocation Change Report that presents the allocation changes for the past month by asset class and investment manager.

In addition, the Investment Committee typically schedules several educational sessions each year to ensure it has a sound foundation upon which it carries out its duties.

On an on-going basis, the Investment Committee monitors IOP performance through the monitoring and oversight of the investment program as a whole.

## X. Definitions

***Acronyms:*** The following is a list of common abbreviations found throughout the IPS.

| Acronym | Full Name |
|---|---|
| ACWI | All Country World Index |
| BofAML | Bank of America Merrill Lynch |
| DM | Developed Markets |
| EM | Emerging Markets |
| EMBI | Emerging Market Bond Index |
| EPRA | European Public Real Estate Association |
| ETF | Exchange Traded Fund |
| EUR | Euro |
| FOF | Fund of Fund |
| FTSE | Financial Times Stock Exchange |
| FX | Foreign Exchange |
| G10 | Group of Ten |
| GBI-EM | Government Bond Index-Emerging Markets |
| GDP | Gross Domestic Product |
| HFRI | Hedge Fund Research Inc. |
| HY | High Yield |
| ICE | Intercontinental Exchange |
| IG | Investment Grade |
| ILB | Inflation-Linked Bond |
| IMI | Investable Market Index |
| ILPA | Institutional Limited Partners Association |
| IRR | Internal Rate of Return |
| JPM | J.P. Morgan |
| LSTA | Loan Syndications and Trading Association |
| MSCI | Morgan Stanley Capital International |
| NAREIT | National Association of Real Estate Investment Trusts |
| NCREIF | National Council of Real Estate Investment Fiduciaries |
| NFI-ODCE | NCREIF Fund Index-Open End Diversified Core Equity |
| OCC | Office of Chief Counsel |
| OFM | Office of Financial Management |
| PME | Public Market Equivalents |
| REIT | Real Estate Investment Trust |
| S&P | Standard & Poor's |
| SOFR | Secured Overnight Financing Rate |
| STRIPS | Separate Trading of Registered Interest and Principal of Securities |
| TIPS | Treasury Inflation Protected Securities |
| TR | Total Return |

| | |
|---|---|
| U.S. | United States |
| USD | US Dollar |

***Actuarial Assumed Rate:*** the investment return assumption adopted by the Board for actuarial purposes.

***Applicable Investment Expenses:*** may include catch-up interest, management fees, organizational expenses, or other expenses payable directly by PSERS outside of its capital commitment not to exceed 15 percent of the amount approved for investment and authorized by IOS.

***Asset Allocation:*** the decision of selecting appropriate weights between broad asset class categories (Private Markets, bonds, cash, commodities, stocks, etc.) in order to produce the desired Risk and return profile for a total fund portfolio. The Asset Allocation decision is the most important investment strategy issue for an investment program.

***Benchmarks*****:** Used by the Board to measure the investment performance (i.e. Policy Index) and risk (i.e. Risk Benchmarks) of each Asset Class. The following are indices used or referenced by the System, noting that any additional performance expectation (i.e. +100 basis points) is not depicted:

For publicly available indices a ticker is provided, and the descriptions are primarily taken from the provider factsheets or website.

**EQUITY:**

***Burgiss Total Return (TR) Index (N/A):*** Performance benchmark data for Private Equity calculated using the rolling 5-year (20 quarters) total returns obtained from Burgiss Private iQ relevant universe (i.e. Generalist, Expansion Capital, Buyout, Debt, Infrastructure, Natural Resources, Secondary Fund of Funds (FOFs), and North America-focused Venture Capital). The benchmark is updated retroactively for the past 20 quarters each quarter. This methodology results in a restatement of the Total Fund Benchmark return from quarter to quarter.

***Morgan Stanley Capital International (MSCI) All Country World Index (ACWI) ex USA Investable Market Index (IMI) (with Developed Market (DM) Currencies 50% Hedged to US Dollar) Net TR Index (unhedged: M1WDUIM; custom hedged: M1CXPPSB):*** The MSCI ACWI ex USA IMI captures large, mid- and small-cap representation across 22 of 23 DM countries, excluding the United States (US), and 25 Emerging Markets (EM) countries. With over 6,000 constituents, the index covers approximately 99% of the global equity opportunity set outside the US. This index hedges currency exposure back to the US Dollar (USD).

***MSCI ACWI ex USA Small Cap Net TR Index (M1WDUSC): (Risk Benchmark)*** The MSCI ACWI ex USA Small Cap Index captures small-cap representation across 22 of 23 DM countries (excluding the US) and 25 EM countries. With over 4,000 constituents, the index covers approximately 14% of the global equity opportunity set outside the US.

***MSCI USA Small Cap TR Index (M2USSC): (Risk Benchmark)*** The MSCI USA Small Cap Index is designed to measure the performance of the small-cap segment of the US equity market. With over 1,900 constituents, the index represents approximately 14% of the free float-adjusted market capitalization in the US.

***Standard & Poor's (S&P) 1500 TR Index:*** *Combines three leading indices, the S&P Large Cap 500, the S&P Mid Cap 400, and the S&P Small Cap 600 to cover approximately 90% of the U.S. market capitalization.*

**FIXED INCOME:**

***Bloomberg US Aggregate Bond TR Index (LBUSTRUU):*** The Bloomberg US Aggregate Bond Index is a broad-based flagship benchmark that measures the IG, USD-denominated, fixed-rate taxable bond market. The index includes Treasuries, government-related and corporate securities, mortgage-backed securities (agency fixed-rate and hybrid adjustable-rate mortgage pass-throughs), asset-backed securities and commercial mortgage-backed securities (agency and non-agency).

***Bloomberg US Corporate High Yield (HY) Bond TR Index (LF98TRUU):*** The Bloomberg US Corporate HY Bond Index measures the USD-denominated, HY, fixed-rate corporate bond market. Securities are classified as HY if the middle rating of Moody's, Fitch and S&P is Ba1/BB+/BB+ or below. Bonds from issuers with an EM country of risk, based on Bloomberg EM country definition, are excluded.

***Bloomberg US Government Inflation-Linked Bond (ILB) All Maturities TR Index (BCIT1T):*** The Bloomberg US Government ILB Index measures the performance of the US Treasury Inflation Protected Securities (TIPS) market.

***Bloomberg US Long Treasury TR Index (LUTLTRUU):*** The Bloomberg US Long Treasury Index measures the performance of USD-denominated, fixed-rate, nominal debt issued by the US Treasury with a maturity greater than 10 years. Separate Trading of Registered Interest and Principal of Securities (STRIPS) are excluded from the index because their inclusion would result in double-counting. The US Long Treasury Index is a component of the US Aggregate, US Universal, Global Aggregate and Global Treasury Indices.

***JPM EMD Aggregate (JPM EM Equal Weighted Total Return Index) (JEMBAGTR)*** – Equally weighted blend of the KPM EMBI Global Diversified, JPM GBI Global Diversified and JPM CEMBI Broad Diversified.

***S&P / Loan Syndications and Trading Association (LSTA) Leveraged Loan TR Index (SPBDAL):*** The S&P/LSTA US Leveraged Loan Indices are rules-based, transparent indices designed to reflect US senior loan facilities in the leveraged loan market. They reflect the market-weighted performance of institutional leveraged loans in the US based upon real-time market weightings, spreads and interest payments. The index components are the institutional tranches (Term Loan A, Term Loan B and higher and Second Lien) of loans syndicated to US loan investors.

**REAL ASSETS:**

***Bloomberg Commodity TR Index (BCOMTR):*** The Bloomberg Commodity TR Index reflects the return on fully collateralized rolling futures positions. BCOMTR is a highly liquid and diversified benchmark for commodity investments. The Index provides broad-based exposure to 23 exchange traded commodities across energy, industrial and precious metals, agriculture and livestock, and no single commodity or commodity sector dominates the Index.

***Bloomberg Gold TR Subindex (BCOMGCTR):*** The Bloomberg Gold TR Subindex reflects the return on fully collateralized rolling gold futures positions.

***Financial Times Stock Exchange (FTSE) Developed Core Infrastructure 50/50 Net Index (Hedged to USD) (FDCICUHN):*** The FTSE Developed Core Infrastructure 50/50 Index gives participants an industry-defined interpretation of infrastructure and adjusts the exposure to certain infrastructure sub-sectors. The constituent weights for this index are adjusted as part of the semi-annual review according to three broad industry sectors – 50% Utilities, 30% Transportation including capping of 7.5% for railroads/railways and a 20% mix of other sectors including pipelines, satellites and telecommunication towers. Company weights within each group are adjusted in proportion to their investable market capitalization. This index hedges currency exposure back to the USD.

***FTSE European Public Real Estate Association (EPRA) / National Association of Real Estate Investment Trusts (NAREIT) Developed ex US TR Index (Hedged to USD) (REGXU): (Risk Benchmark)*** The FTSE EPRA/NAREIT Developed ex US Index is a subset of the FTSE EPRA/NAREIT Developed Index and is designed to track the performance of listed real estate companies and real estate investment trusts (REITs). By making the index constituents free-float adjusted, liquidity, size and revenue screened, the series is suitable for use as the basis for investment products, such as derivatives and exchange traded funds (ETFs). This index hedges currency exposure back to the USD.

***FTSE EPRA/NAREIT Developed Net TR Index (Hedged to USD) (GPPPSH1):*** The FTSE EPRA/NAREIT Global Real Estate Index Series is designed to represent general trends in eligible real estate equities worldwide. Relevant activities are defined as the ownership, disposal and development of income-producing real estate. The FTSE EPRA/NAREIT Developed Index is designed to track the performance of listed real estate companies and REITs worldwide. By making the index constituents free-float adjusted, liquidity, size and revenue screened, the series is suitable for use as the basis for investment products, such as derivatives and ETFs. This index hedges currency exposure back to the USD.

***FTSE NAREIT Composite TR Index (FNCOTR): (Risk Benchmark)*** The FTSE NAREIT Composite TR Index is a free-float adjusted, market capitalization-weighted index of US equity and mortgage REITs. Constituents of the Index include all tax-qualified REITs that also meet FTSE's minimum size and liquidity criteria.

**National Council of Real Estate Investment Fiduciaries (NCREIF) Fund Index *and Burgiss TR Index (N/A):*** Performance benchmark for Private Real Estate is calculated using the total returns obtained from Burgiss iQ relevant universe (i.e. value-added and opportunistic real estate). A rolling 5-year (20 quarters) lookback is being built out effective first quarter 2015. The NCREIF Fund Index-Open End Diversified Core Equity (NFI-ODCE) is an index of investment returns reporting on both a historical and current basis the results of 36 open-end commingled funds pursuing a core investment strategy. The NFI-ODCE Index is capitalization-weighted and measurement is time-weighted.

**<u>CASH:</u>**

***ICE BofAML 0-3 Month US Treasury Bill Index (G0B1):*** ICE BofAML 0-3 Month US Treasury Bill Index is a subset of ICE BofAML US Treasury Bill Index including all securities with a remaining term to final maturity less than 3 months.

**<u>FINANCING:</u>**

***Secured Overnight Financing Rate (SOFR) 3-Month (TSFR3M):*** A broad measure of the cost of borrowing cash overnight collateralized by Treasury securities. SOFR includes all trades in the Broad General Collateral Rate plus bilateral Treasury repurchase agreement (repo) transactions cleared through the Delivery-versus-Payment (DVP) service offered by the Fixed Income Clearing Corporation (FICC), which is filtered to remove a portion of transactions considered "specials." Each business day, the New York Fed publishes the SOFR on the New York Fed website at approximately 8:00 a.m. (New York Time).

***Board:*** The Pennsylvania Public School Employees' Retirement Board.

***CDO:*** A collateralized debt obligation (CDO) is a **structured financial product** that pools together cash flow-generating assets and repackages this asset pool into discrete tranches that can be sold to investors.

***CLO:*** A **collateralized loan** obligation (**CLO**) is a single security backed by a pool of debt. Often these are corporate **loans**.

***Custodian Bank:*** an institution that safekeeps cash, stocks, bonds, and other securities. The System's Custodian Bank has a contract with the State Treasurer, the legal custodian of the System.

***EPRA***: acronym for the European Public Real Estate Association. EPRA is a common interest group that promotes, develops, and represents the European public real estate sector.

***Evergreen:*** A type of fund structure that has an indefinite life, where investors or limited partners are afforded the opportunity to exit the investment at predetermined periodic intervals or given a notice of predetermined length. (examples: 90 days' notice or once per year)

***External Manager:*** a firm registered with the SEC as an Investment Advisor, or otherwise qualified if exempted from SEC registration that provides investment advisory services with respect to the management of assets within a separate account, fund, or limited partnership.

***Internal Manager:*** an individual employed by the Board who manages an investment portfolio.

***Investment Consultant:*** a third-party firm retained by the Board to provide advice on various investment issues ranging from general advice to advice on specialty asset classes. The System's Private Markets Investment Consultant is also referred to as specialty Investment Consultant.

***Investment Guidelines:*** an outline of policy or conduct expected in the management of an investment portfolio.

***Investment Office Directors:*** includes the Managing Director of Fixed Income, the Managing Director of Investment Operations and Risk, the Director of Private Equity, and the Director of Risk Parity, Currency Hedging, and Strategic Implementation.

***Investment Manager:*** includes both Internal Managers and External Managers.

***ISDA:*** International Swaps and Derivatives Association. ISDA is an association created by the private negotiated derivatives market that represents participating parties. This association helps to improve the private negotiated derivatives market by identifying and reducing Risks in the market.

***Mark-to-Market:*** the valuation of a security or other instrument, transaction, or portfolio of the same to current market prices.

***NPL:*** A non-performing loan (NPL) is a loan that is in default or close to being in default. Many loans become non-performing after being in default for 90 days, but this can depend on the contract terms.

***Operational Risk:*** risks for improper monitoring of positions, bad pricing, inadequate software, system failures or human error.

***OTC:*** acronym for over-the-counter. OTC securities, derivatives, and other financial instruments are traded in some context other than on a formal or centralized exchange such as the New York Stock Exchange, Chicago Mercantile Exchange, etc.

***Private Investments:*** investments in limited partnerships, limited liability companies.

***Securities Lending Program:*** an investment program designed to generate incremental income from lending securities to qualified borrowers who provide collateral in exchange for the right to use the securities.

***Separate Account:*** a privately managed account in which the System's investments are managed independent of other investors and in which assets are accounted for in a segregated investment account. Separate Accounts generally have investments generally held by the System's Custodian Bank or in a Fund-of One created by the Investment Manager.

***Sharpe Ratio:*** a measure that indicates the average return minus the risk-free return divided by the standard deviation of return on an investment.

***Staff:*** employees of the System.

***State Treasurer:*** the Treasurer of the Commonwealth of Pennsylvania.

***Tracking Error:*** is a statistical measure of the potential variability of a portfolio's return relative to that of the assigned benchmark. For purposes of Board Policies, it is defined as the realized annualized standard deviation of monthly returns relative to the Policy benchmark over the trailing 36 months. Tracking Error for an Explicitly Leveraged Portfolio, as defined within the Leverage Policy, is measured as if the portfolio was not levered.