



Massachusetts Water Resources Authority  
Employees' Retirement System  
(a Fiduciary Component Unit of the  
Massachusetts Water Resources Authority)



Annual Comprehensive Financial Report  
For the Year Ended December 31, 2021



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Employees' Retirement System  
(a Fiduciary Component Unit of the Massachusetts  
Water Resources Authority)



Annual Comprehensive Financial Report  
For the Year Ended December 31, 2021

Prepared by the Staff and Management of the  
Massachusetts Water Resources Authority Employees' Retirement System

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## Introductory Section



## MWRA EMPLOYEES' RETIREMENT SYSTEM

September 16, 2022

Dear Members of the MWRA Employees' Retirement System and interested readers:

On behalf of the MWRA Employees' Retirement Board (MWRAERB), I am pleased to present the Annual Comprehensive Financial Report (ACFR) of the MWRA Employees' Retirement System (MWRAERS) for the year ended December 31, 2021. The report is designed to provide a detailed look at the financial, investment and actuarial aspects of the MWRAERS.

A comprehensive report is being issued in the interest of full disclosure to the MWRAERS's members and to demonstrate the diligent stewardship and internal controls that are in place to protect assets and maintain financial integrity. The MWRAERS has received the Government Finance Officers Association Certificate of Achievement for Excellence in Financial Reporting each year from 2013 through 2020, a very prestigious award that only a few public retirement systems in New England have received. We are confident that we will be awarded another Certificate for 2021.

By statute the MWRA Employees' Retirement Board meets at least once a month to discuss and review benefit and investment issues and to conduct due diligence assessments of the System's investments. We have continued to do so over the past year via remote meeting, with open access granted to the public. It is the fiduciary responsibility of the Board to insure that current and future retirement benefits will be paid. Therefore, safeguarding the MWRAERS's investment portfolio is a top priority. The MWRAERB has developed an investment policy that incorporates an asset allocation with a long-term time horizon and participant demographics. The policy also reflects the impact of the MWRAERS's having one of the highest funded ratios among public pension Systems in the Commonwealth. Our higher than average funded ratio allows the MWRAERS's portfolio to incorporate less risk than those of Systems with lower funded ratios, which often rely on assuming additional risk as a means to maximize returns, in order to reduce funding deficits. Our portfolio is designed to combine asset classes that involve some investment risk with those intended to yield more stable and predictable returns, and to diversify sufficiently the assets to mitigate risks during the inevitable times when certain asset classes experience more volatile returns.

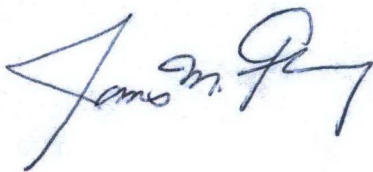
Investment returns were robust in 2021, driven primarily by equities, with the Domestic Equity portfolio returning 23.2%, led by US Large Cap with a return of 24.5%, and the Private Equity portfolio returning 43.4% contributing to the MWRAERS portfolio's finishing the 2021 year at 13.4% overall.

The recently completed January 1, 2022 Actuarial Study of the MWRA Employees' Retirement System showed an unfunded actuarial liability of \$82.0 million on the basis of the actuarial value of assets. The decrease in the unfunded liability when compared to the 1/1/21 valuation is due in large part to the significant investment gains. Some of the gains were used to offset the Board's reduction in the investment return assumption from 7.1% to 6.9% and the adoption of new mortality assumptions. In conjunction with modifications to the Board's Investment Objectives and Asset Allocation, the changes were made by the Board to approximate more accurate long-term expectations, and are considered a strategic means to reduce risk over the long term. On June 1, 2022, the MWRA Employees' Retirement Board, based on the January 1, 2022 Valuation results, adopted a funding schedule which incorporates the retiree cost of living increase of 3% calculated on the first \$17,000 in annual benefits for fiscal year 2023, covers the Employer Normal Cost, and funds the amortization of the Unfunded Actuarial Accrued Liability by FY2030. Given the Retirement System's previously abbreviated time horizon to full funding, the funding approach was adopted in order to reduce volatility and to better stabilize the plan sponsor's future appropriation requirements, in order to facilitate budget planning for the Authority as well as for its member communities.

I would like to thank the other Board members for their work ethic and dedication to their service on the Board, as well as the Board's investment consultant, actuary and independent auditors for their valuable assistance with both the preparation of this report, and with other matters entrusted to them. I would also like to thank the Board's legal representatives for their counsel, and acknowledge the Public Employee Retirement Administration Commission for their oversight of our operations.

Finally, I would like to commend the staff of MWRAERS for their diligent work in preparing this report and their commitment to continually improving administrative operations. I encourage members to review this report carefully, as it contains a wealth of information about your retirement system.

Sincerely,

A handwritten signature in blue ink that reads "James M. Fleming". The signature is stylized and cursive.

James M. Fleming, Esq.  
Chairman



## MWRA EMPLOYEES' RETIREMENT SYSTEM

September 16, 2022

MWRA Employees' Retirement Board  
2 Griffin Way  
Chelsea, MA 02150

Dear Mr. Chairman and Members of the Board:

I am pleased to submit the Annual Comprehensive Financial Report (ACFR) of the MWRA Employees' Retirement System (MWRAERS) for the year ended December 31, 2021. The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the MWRAERS for the year ended December 31, 2020. This award is granted when an organization has submitted an ACFR that satisfies the stringent accounting standards and legal requirements set forth by the GFOA.

GASB Statement No. 34 requires that management provide a narrative introduction, overview and analysis to accompany the basic financial statements in the form of Management's Discussion and Analysis (MD&A). This letter of transmittal is designed to complement the MD&A and should be read in conjunction with it. The MWRAERS's MD&A can be found immediately following the report of the independent auditor.

Management assumes full responsibility for the completeness and reliability of the information contained in this report, based upon a comprehensive framework of internal control that it has established for this purpose. Because the cost of internal control should not exceed anticipated benefits, the objective is to provide reasonable, rather than absolute, assurance that the financial statements are free of any material misstatements.

### **History of the MWRAERS**

The MWRAERS was established as part of the Enabling Act in 1984 and became operative on July 1, 1985. The MWRAERS is a contributory defined benefit plan that covers eligible employees of the Massachusetts Water Resources Authority (MWRA). The MWRAERS is administered by a five member Board consisting of the MWRA's Board of Director's Secretary (Ex-Officio Member), the MWRA's Director of Finance (MWRA Appointed Member), two representatives elected from the membership, and a fifth member chosen by the other four who cannot be an employee, retiree or official of the MWRA. One Board member is elected from the group to serve as Chairman.



## **Investment Results**

The MWRAERS has an Investment Policy Statement which establishes investment objectives and policies providing the framework for investments. This Policy is reviewed on an annual basis. A summary of the Investment Policy is included in the Investment Section. The System uses a custodian bank to safeguard the assets and ensure proper settlement and recording of transactions.

An integral part of the overall investment policy is the asset allocation policy. MWRAERS' asset allocation is designed to provide an optimal mix of asset classes to both preserve principal and provide adequate funds to pay pension benefits. Assets are allocated over various classes such as domestic stocks, domestic bonds, international stocks, real estate, private equity, hedge funds and global assets. The investment market results have demonstrated consistently the importance of a well-diversified asset allocation.

MWRAERS' dollar-weighted investment return of 13.4% for 2021 exceeded the actuarial expected rate of return and the Investment policy benchmark. Please refer to the Investment Section of this ACFR for more information on investment results.

## **Major Initiatives**

Chapter 68 of the Acts of 2007, An Act to Reduce the Stress on local Property Taxes Through Enhanced Pension Fund Investment, was signed into law July 25, 2007. This Act amends MGL chapter 32 section 22 and directs the Public Employee Retirement Administration Commission (PERAC) to conduct an annual analysis of all Massachusetts public pension plans. The assessment includes the investment performance and funded ratio of each system every January 1st in accordance with the established methodology and standard. Systems failing to meet the standard are mandated to transfer the systems assets to the Massachusetts Pension Reserve Investment Management (PRIM) Board. The MWRAERS has exceeded these standards for each year since 2007 and is therefore not subject to the mandatory transfer of system assets.

## **Benefits**

An increase to the base upon which the 3% cost of living adjustment (COLA) for retirees is calculated was voted by the MWRAERB. The COLA base increased from \$13,000 to \$14,000 effective in FY20, from \$14,000 to \$15,000 in FY21, and an increase from \$15,000 to \$17,000 was recently approved to become effective FY23. The MWRAERS has granted the maximum 3% cost-of-living allowed by law since enactment of the legislation in 1997.

The MWRA Employees' Retirement Board approved increases to benefits for survivors of deceased active employees under C. 32, s. 12, as well as for survivors of accidental disability retirees receiving benefits in accordance with C. 32, s. 101. For survivors of active employees, the minimum benefit increased from \$250 to \$500 monthly, while for survivors of accidental disability retirees with effective retirement dates prior to November 1, 1996, the minimum allowance went from \$500 to \$750.

Signed into law on November 18, 2011, Chapter 176 of the Acts of 2011 became effective February 16, 2012 and is thought to reform and modernize the pension laws for Public employees in Massachusetts. The law creates a new benefit structure for employees hired on or after April 2, 2012. The new age factors established will increase the minimum age for retirement. Calculation of the pension will use a 5-year average salary and contains anti-spiking provisions for both new members and current employees.

## **Administration**

In May 2021, Mr. James Fleming was re-elected to the first elected Board Member's position and will serve a three-year term ending in 2024. Mr. Andrew Pappastergion, the Secretary for the Board of Directors of the MWRA was appointed as the Ex-Officio Member of the Board effective February 19, 2020.

Chapter 176 of the Acts of 2011 has a number of corporate governance provisions that require the MWRAERS adhere to specific procurement procedures for investment management and related services. The Act also mandates training and financial disclosures of all Board members, and all MWRA Retirement Board members are in full compliance with these requirements.

The MWRAERS strives to provide quality service and information to active and retired members and their beneficiaries, and to the public. To assist in this effort, we maintain and continually update our internet site, at [www.mwraetirement.com](http://www.mwraetirement.com), and the web portal which provides employees and retirees direct access to their own information has proven to be a useful tool. Our site was recently updated to reflect new standards and requirements for public records disclosures, in order to facilitate access to public information. Easy access to all of the System's financial data has expanded on the site, and now includes our ACFR, Audits, summary Annual Reports published by PERAC, investment performance, Board meeting materials, and other information. Though we have been able to resume in-person meetings, we have prioritized maintaining continued remote public access to the meetings by publishing in advance meeting access information on our website as well as that of the Secretary of the Commonwealth.

## **Internal and Budgetary Controls**

The MWRAERS management is responsible for maintaining a system of internal controls designed to provide reasonable, but not absolute, assurance that the financial statements are fairly stated in accordance with accounting principles generally accepted in the United States of America while adequately safeguarding the assets. The thorough review and update of the internal control procedures is being continually reviewed in order to further strengthen the established safeguards on behalf of our membership, and to adapt to ever-evolving external threats. The concept of reasonable assurance recognizes that the cost of internal controls should not exceed their anticipated benefits

The MWRAERS budget is presented to and approved by the Board each year. All the expenditures are reviewed by the Board at its monthly meeting and compared to the budget on a year-to-date basis.

## Accounting

This report has been prepared in accordance with accounting principles generally accepted in the United States of America. The basic financial statements are presented in accordance with the principles of the Government Accounting Standards Board (GASB), including guidelines established by GASB Statements No. 25, Financial reporting for defined benefit plans; No. 34, Basic Financial Statements - and Management's Discussion and Analysis - for State and Local Governments; No. 37, Basic Financial Statements- and Management's Discussion and Analysis- for State and Local Governments: Omnibus, No. 38, Certain Financial Statement Note Disclosures; No. 40 Deposit and Investment Risk Disclosures (an amendment of GASB No.3); and No. 67 Financial Reporting for Pension Plans – an amendment of GASB Statement No. 25.

CliftonLarsonAllen LLP (CLA), a firm of licensed certified public accountants, performed the audit for the MWRAERS. The goal of the independent audit is to provide reasonable assurance that the financial statements for the year ended December 31, 2021 are free of material misstatements. The report of the independent auditors is included in the Financial Section of this report. CLA has issued an unmodified opinion on the MWRAERS's basic financial statements for the year ended December 31, 2021.

## Actuarial Funding

After an open and competitive search process conducted in 2020, the MWRAERS retained the services of The Segal Company, an independent actuarial firm, to conduct an actuarial valuation of the MWRAERS as of January 1, 2022. The funded ratio is one measure of the financial condition of the MWRAERS. The funded ratio is calculated by dividing the net assets of the MWRAERS by the projected pension liability. The projected pension liability is a measure of the present value of total pension benefits estimated to be payable in the future to both current and future retirees and/or beneficiaries. A higher funding ratio gives the members a greater degree of assurance that their pension benefits are secure. As of January 1, 2022, the funded ratio of the MWRAERS was calculated at 89.05% using the actuarial value of assets. On a market value basis the funded ratio was 97.32%. Notably, this funded ratio was achieved in the 1/1/22 valuation in spite of the MWRAERB's reducing the assumed rate of return on investments from 7.1% to 6.9% in 2021, a strategic move made by the Board to ensure that long term expectations are realistic, and adopting updated mortality tables which more closely mirror recent plan experience, both of which measures in turn reduce the risk of future actuarial losses.

## Acknowledgements

I am pleased to have completed this report in accordance with the GFOA Certificate of Achievement guidelines and proud to provide an annual report to our members that is both easy to read and comprehensive. This publication was prepared with the combined efforts of the auditors, actuaries and investment consultant and I would like to acknowledge and thank them for their hard work and tireless collaboration.

Respectfully submitted,



Carolyn Russo  
Executive Director

## Retirement Board Members

		Term Expiration
Andrew Pappastergion	Ex-Officio Member	No expiration
Thomas J. Durkin	Appointed Member	6/30/2024
James M. Fleming	Elected Member	6/30/2024
Kevin McKenna	Elected Member	4/29/2023
Frank Zecha	Member Appointed by Other Members	1/24/2025

## Retirement Board Staff

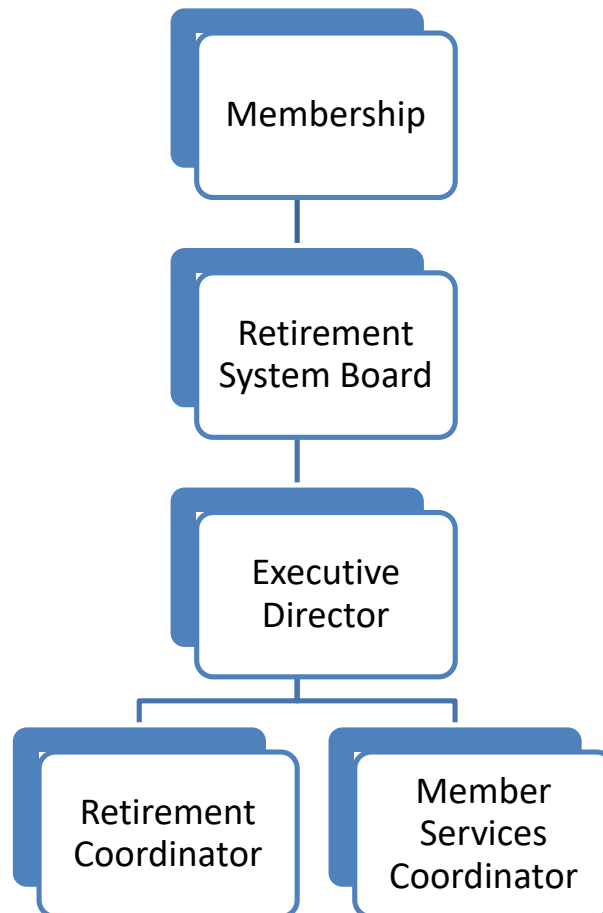
Carolyn M. Russo	Executive Director
Julie McManus	Retirement Coordinator
Danielle DiRuzza	Member Services Coordinator

## Organizational Chart

*This Chart does not include Investment professionals who provide services to MWRAERS.*

A list of these investment professionals is located on the following page.

Asset allocation, return, and fee information may be found under the Investment Section on pages 50-52.



## Consultants, Fund Managers and Professionals

### Fund Managers

#### ABS

Emerging Markets

#### Alcentra, New York, NY

Private Equity - Alcentra European DLF

#### Ascent Venture Partners, Boston, Massachusetts

Private Equity - Ascent Fund IV

Private Equity - Ascent Fund IV-B

Private Equity - Ascent Fund V

Private Equity - Ascent Fund VI

#### Axiom, Greenwich, CT

Emerging Markets

#### Baillie Gifford

International Equity

#### Boston Company/BNY Mellon, Boston, Massachusetts

International Equity

#### CarVal New York, NY

Private Equity-CVI Credit Value Fin A IV

#### Cerberus Capital Management L.P. , New York, New York

Real Estate- Institutional Real Estate III

#### Coho Partners, Berwyn, Pennsylvania

Equities - Large Cap Value

#### Constitution Capital Partners, Andover, Massachusetts

Private Equity-Ironside Opportunities Fund

#### Corbin Capital Partners, New York, New York

Hedge Fund of Funds

#### Entrust, New York, New York

Hedge Fund of Funds

#### Foundry Group, Boulder, Colorado

Private Equity - Foundry 2007

Private Equity - Foundry 2010

Private Equity - Foundry 2010 Annex

#### Garcia Hamilton, Houston, Texas

Fixed Income-Fixed Income Aggregate Strategy

#### Hamilton Lane, Cynwyd, PA

Private Equity-Fund V

#### Harbourvest, Boston, MA

Private Equity-Dover Street X

#### Hartford Schroders Investment Management, New York, New York

International Equity - Alpha CIT

#### Invesco, New York, New York

Fixed Income - Mortgage Recovery AIV

Fixed Income - Mortgage Recovery II

Private Equity - Invesco Fund VI

#### J.F. Lehman, New York, New York

Private Equity - JFL Equity Investors IV

Private Equity- JFL Equity Investors V

#### Kayne Anderson Capital Advisors, Los Angeles, California

Private Equity - Energy Fund VII

#### Landmark Partners, Simsbury, Connecticut

Real Estate - Landmark VI

Private Equity - Landmark VIII

Private Equity - Landmark XV

#### Loomis Sayles, Boston, Massachusetts

Small Cap - Small Cap Growth

Fixed Income - Multi Sector Bonds FDT

#### Lord Abbett, Jersey City, New Jersey

Fixed Income - Lord Abbett Core Fixed Income

#### Morgan Stanley, New York, New York

Real Estate - Prime Property

#### Octagon, New York, NY

Fixed Income-Senior Secured Credit

### Fund Managers (Continued)

#### PA Capital, Richmond, VA (Formerly Private Advisors)

Private Equity -Small Co. Coinvestment Fund

#### Park Square New York, New York

Private Equity - Credit Opportunities Fund III

#### Pinebridge, New York, NY

Private Equity - Credit Opportunities Fund III

#### Pension Reserves Investment Trust (PRIT), Boston, Massachusetts

PRIT General Allocation Account

PRIT Hedge Fund

Private Equity - Vintage Year 2008

Private Equity - Vintage Year 2009

Private Equity - Vintage Year 2010

Private Equity - Vintage Year 2011

Private Equity - Vintage Year 2012

Private Equity - Vintage Year 2014

Private Equity - Vintage Year 2017

Private Equity - Vintage Year 2020

Private Equity - Vintage Year 2021

#### Polen Capital, Boca Raton, Florida

Equities - Large Cap Growth

#### Rumblin Advisors, Boston, Massachusetts

Large Cap -S&P 500 Index Fund

US TIPS

#### Robeco Boston Partners, Boston, Massachusetts

Small Cap - Small Cap Value

#### Select Equity Group

International Equity - Baxter Street Fund

#### Stepstone (Courtland Partners), Cleveland, Ohio

Real Estate - Real Estate Global Fund II

#### TA Realty, Boston, Massachusetts

Real estate - Fund X UTP

Real estate - Core Real Estate

#### TerraCap, Bonita Springs, Florida

Real Estate - Terracap Partners III

Real Estate - Terracap Partners IV

#### UBS Stamford, Connecticut

Hedge Fund of Funds-A&Q Neutral Alpha Strategies

### Custodian

People's United Bank/Bank New York Mellon, New York

### Legal Advisors

The Law Offices of Thomas F. Gibson, Cambridge, Massachusetts

### Actuary

The Segal Group, Boston, Massachusetts

### Investment Consultant

NEPC, LLC, Boston, Massachusetts

### Independent Auditors

CliftonLarsonAllen LLP, Lexington, Massachusetts

### Commission Recapture Brokers

Abel Noser, New York, NY

ConvergEx Group, New York, NY

### Securities Fraud Monitoring

Berman Tabacco, Boston, Massachusetts

Chimicles Tschwartz Kriner & Donaldson-Smith, Haverford, Pennsylvania

Cohen Milstein, Chicago, Illinois

Kessler Topaz Melzer & Check, Radnor, Pennsylvania

Robbins Geller Rudman & Dowd, Philadelphia, Pennsylvania

Scott & Scott, New York, New York



Government Finance Officers Association

Certificate of  
Achievement  
for Excellence  
in Financial  
Reporting

Presented to

**Massachusetts Water Resources Authority  
Employees' Retirement System**

For its Annual Comprehensive  
Financial Report  
For the Fiscal Year Ended

December 31, 2020

*Christopher P. Morrill*

Executive Director/CEO



## Financial Section



## INDEPENDENT AUDITORS' REPORT

To the Honorable Retirement Board  
Massachusetts Water Resources Authority Employees' Retirement System

### **Report on the Audit of the Financial Statements**

#### ***Opinion***

We have audited the accompanying financial statements of the Massachusetts Water Resources Authority Employees' Retirement System (the System), a fiduciary component unit of the Massachusetts Water Resources Authority, as of and for the year ended December 31, 2021, and the related notes to the financial statements, which collectively comprise the System's basic financial statements, as listed in the table of contents.

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the System as of December 31, 2021, and the changes in fiduciary net position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

#### ***Basis for Opinion***

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the Auditors' Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the System and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

#### ***Responsibilities of Management for the Financial Statements***

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the System's ability to continue as a going concern for twelve months beyond the financial statement date, including any currently known information that may raise substantial doubt shortly thereafter.



***Auditors' Responsibilities for the Audit of the Financial Statements***

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS and *Government Auditing Standards*, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the System's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the System's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control related matters that we identified during the audit.

***Required Supplementary Information***

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis, schedule of changes in employer net pension liability and related ratios, schedule of employer contributions and schedule of investment returns be presented to supplement the basic financial statements. Such information is the responsibility of management and, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with GAAS, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

**Supplementary Information**

Our audit was conducted for the purpose of forming an opinion on the System's basic financial statements. The schedule of administrative expenses and schedule of investment and consultants' expenses are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. The information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with GAAS. In our opinion, the schedule of administrative expenses and the schedule of investment and consultants' expenses are fairly stated, in all material respects, in relation to the basic financial statements as a whole.

**Other Information**

Management is responsible for the other information included in the annual report. The other information comprises the introductory section, investment section, actuarial section, and statistical section, but does not include the basic financial statements and our auditors' report thereon. Our opinion on the basic financial statements do not cover the other information, and we do not express an opinion or any form of assurance thereon.

In connection with our audit of the basic financial statements, our responsibility is to read the other information and consider whether a material inconsistency exists between the other information and the basic financial statements, or the other information otherwise appears to be materially misstated. If, based on the work performed, we conclude that an uncorrected material misstatement of the other information exists, we are required to describe it in our report.

**Other Reporting Required by Government Auditing Standards**

In accordance with *Government Auditing Standards*, we have also issued our report dated September 16, 2022 on our consideration of the System's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the System's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the System's internal control over financial reporting and compliance.



**CliftonLarsonAllen LLP**

Boston, Massachusetts  
September 16, 2022

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
MANAGEMENT'S DISCUSSION AND ANALYSIS  
DECEMBER 31, 2021

As management of the Massachusetts Water Resources Authority Employees' Retirement System (System), we offer readers of these financial statements this narrative overview and analysis of the System's financial activities for the year ended December 31, 2021.

### **Financial Highlights**

The System's funding objective is to meet long-term benefit obligations through contributions and investment income. As of January 1, 2022, the latest actuarial valuation, the funded ratio was 89.05% based on the actuarial value of assets at that date. As of December 31, 2021, the plan fiduciary net position was 97.32% of the total pension liability.

The System's net position increased by \$80,296,473 or 12.4%, when compared to the prior year's net position. Net position is the residual of the System's assets in excess of the System's liabilities as of the statement date. The System's assets are held in trust to meet future benefit payments.

Net investment income was \$89,018,608. The money-weighted investment return of 16.70% exceeded the actuarial expected rate of return and the Investment policy benchmark.

### **Overview of the Financial Statements**

The financial statements are comprised of a Statement of Fiduciary Net Position, Statement of Changes in Fiduciary Net Position, Notes to the Financial Statements and Required Supplementary Information.

The **statement of fiduciary net position** presents information on the System's assets and liabilities and the resulting net position held in trust for pension benefits. This is calculated using the following formula: Assets – Liabilities = Net Position restricted for pensions. This statement reflects the System's investments at fair value, as well as cash, receivables and liabilities. The Statement of Fiduciary Net Position reports the financial position of the System at December 31, 2021. Over time, the increase or decrease in net position serves as a useful indicator of the System's financial health.

The **statement of changes in fiduciary net position** presents information showing how the System's net position changed during the year ended December 31, 2021. It reflects contributions by its individual members and participating employer along with deductions for retirement benefits, refunds, withdrawals, and administrative expenses. Investment income during the period is also presented showing income from investing activities.

The **notes to the financial statements** provide additional information that is essential for the reader to gain a full understanding of the data provided in the financial statements.

The **required supplementary information** includes a schedule of changes in employer net pension liability and related ratios, a schedule of employer contributions and a schedule of investment returns.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
MANAGEMENT'S DISCUSSION AND ANALYSIS  
DECEMBER 31, 2021

**Financial Analysis**

The System's total assets as of December 31, 2021 were \$728,992,352 and were comprised of cash and cash equivalents, investments, and receivables. Total assets increased \$79,964,351 or 12.3%, from the prior year.

Total liabilities as of December 31, 2021 were \$319,663 and represent accounts payable, accrued expenses, and payables for securities purchased. Total liabilities decreased \$332,122 or 51.0%, from the prior year.

The following tables present current and prior year data on the System's financial statements.

Fiduciary Net Position

Net position was \$728,672,689 at the close of the year and is summarized as follows:

**Statement of Fiduciary Net Position**

	2021	2020
<b>Assets</b>		
Cash and cash equivalents.....	\$ 19,169,289	\$ 7,494,640
Investments.....	703,416,270	640,881,284
Receivables.....	6,406,793	652,077
Total assets.....	728,992,352	649,028,001
<b>Liabilities</b>		
Accounts payable and accrued expenses.....	147,540	269,380
Due to MWRA.....	-	77,675
Payable for securities purchased.....	172,123	304,730
Total liabilities.....	319,663	651,785
<b>Fiduciary Net Position</b>		
Restricted for pensions.....	\$ 728,672,689	\$ 648,376,216

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
MANAGEMENT'S DISCUSSION AND ANALYSIS  
DECEMBER 31, 2021

Changes in Fiduciary Net Position

The System's net position increased by \$80,296,473 during the year and is summarized as follows:

**Statement of Changes in Fiduciary Net Position**

	<u>2021</u>	<u>2020</u>
<b>Additions</b>		
<i>Contributions:</i>		
Employer.....	\$ 11,205,000	\$ 10,000,000
Plan members.....	<u>9,892,233</u>	<u>10,187,970</u>
Total contributions.....	21,097,233	20,187,970
<i>Investment income:</i>		
Net increase in fair value of investments.....	80,005,390	68,757,576
Interest and dividends.....	14,657,135	9,473,740
Less investment fees.....	<u>(5,643,917)</u>	<u>(3,283,762)</u>
Net investment income.....	89,018,608	74,947,554
Reimbursements and transfers from other systems.....	<u>1,994,403</u>	<u>2,095,914</u>
Total additions.....	<u>112,110,244</u>	<u>97,231,438</u>
<b>Deductions</b>		
Benefits and refunds paid to plan members and beneficiaries.....	31,000,583	27,148,349
Reimbursements and transfers to other systems.....	487,451	260,612
Administrative expenses.....	<u>325,737</u>	<u>403,213</u>
Total deductions.....	<u>31,813,771</u>	<u>27,812,174</u>
Change in fiduciary net position.....	80,296,473	69,419,264
Fiduciary net position restricted for pensions - beginning of year.....	<u>648,376,216</u>	<u>578,956,952</u>
Fiduciary net position restricted for pensions - end of year.....	<u>\$ 728,672,689</u>	<u>\$ 648,376,216</u>

**Additions to Fiduciary Net Position**

The amount needed to finance benefits is accumulated through the collection of employer and plan member contributions, earnings on investments and reimbursements and transfers from other systems. These additions resulted in an increase to net position totaling \$112,110,244 during the current year versus an increase of \$97,231,438 in the previous year. The 2021 and 2020 employer contributions represent 100.0% of the respective annual required contributions. The System had a net investment gain of \$89,018,608 in 2021 which was consistent with a gain of \$74,947,554 in 2020 due to continued favorable market conditions.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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**Deductions from Fiduciary Net Position**

The primary deductions of the System include the payment of pension benefits to participants and beneficiaries, refunds of contributions, and the costs of administering the System. Deductions to net position totaled \$31,813,771 during the current year versus \$27,812,174 in the previous year. The payment of pension benefits increased by \$3,852,234 or, 14.19%, over the previous year. The increase in these expenses resulted from an increase in benefit payments to newer retirees with higher average compensation.

**Overall Financial Position**

The System experienced a large increase in net position for the year ending December 31, 2021, due to investment performance. Management believes the System is in a solid financial position and will be able to meet its obligations in the future.

**Requests for Information**

This financial report is designed to provide the Board, our membership, taxpayers, investors, and creditors with a general overview of the System's financial results and to demonstrate the System's accountability for the funding it receives. If you have any questions about this report or need additional financial information, contact the Executive Director at 2 Griffin Way, Chelsea, Massachusetts 02150.



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MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
STATEMENT OF FIDUCIARY NET POSITION  
DECEMBER 31, 2021

<b>Assets</b>	
Cash and cash equivalents.....	\$ <u>19,169,289</u>
Investments:	
Fixed income.....	163,159,104
Equities.....	366,452,758
Real estate.....	59,604,356
Private equity.....	52,702,977
Hedge funds.....	28,070,689
PRIT (external investment pool).....	<u>33,426,386</u>
Total investments.....	<u>703,416,270</u>
Receivables:	
Accrued interest and dividends.....	192,774
For investments sold.....	6,051,697
Other.....	<u>162,322</u>
Total receivables.....	<u>6,406,793</u>
Total assets.....	<u>728,992,352</u>
<b>Liabilities</b>	
Accounts payable and accrued expenses.....	147,540
Payable for securities purchased.....	<u>172,123</u>
Total liabilities.....	<u>319,663</u>
<b>Fiduciary net position restricted for pensions.....</b>	<b>\$ <u><u>728,672,689</u></u></b>

See accompanying Notes to Financial Statements.



MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
STATEMENT OF CHANGES IN FIDUCIARY NET POSITION  
FOR THE YEAR ENDED DECEMBER 31, 2021

<b>Additions:</b>	
Contributions:	
Employer.....	\$ 11,205,000
Plan members.....	<u>9,892,233</u>
Total contributions.....	<u>21,097,233</u>
Investment income:	
Interest and dividends.....	14,657,135
Net increase in fair value of investments.....	80,005,390
Less: investment fees.....	<u>(5,643,917)</u>
Net investment income.....	<u>89,018,608</u>
Reimbursements and transfers from other systems.....	<u>1,994,403</u>
Total additions.....	<u>112,110,244</u>
<b>Deductions:</b>	
Benefits and refunds paid to plan members and beneficiaries.....	31,000,583
Reimbursements and transfers to other systems.....	487,451
Administrative expenses.....	<u>325,737</u>
Total deductions.....	<u>31,813,771</u>
Change in fiduciary net position.....	80,296,473
Fiduciary net position restricted for pensions:	
Beginning of year.....	<u>648,376,216</u>
<b>End of year.....</b>	<u><u>\$ 728,672,689</u></u>

See accompanying Notes to Financial Statements.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
NOTES TO THE FINANCIAL STATEMENTS  
DECEMBER 31, 2021

**NOTE 1 – SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES**

**A. Reporting Entity**

The Massachusetts Water Resources Authority Employees' Retirement System (System) was established to provide pension benefits to Massachusetts Water Resources Authority (Authority) employees and their beneficiaries. The System is governed by a five-member board comprised of the Secretary of the Authority's Board (ex-officio), two members elected by the System's participants, one member appointed by the Authority's Board and one member appointed by the System's Board members.

The System is included as a fiduciary component unit in the Authority's financial statements because of its financial relationship with the Authority.

**B. Basis of Accounting**

The accompanying financial statements are presented on the accrual basis of accounting as prescribed by the Governmental Accounting Standards Board (GASB).

**C. Cash, Cash Equivalents and Investments**

Cash and cash equivalents is considered to be cash on hand, demand deposits and short-term investments with an original maturity of three months or less from the date of acquisition.

Investments are reported at fair value. Fair values of investments are based on quotations from a national securities exchange, except for the Systems' investment in the Pension Reserves Investment Trust (PRIT), hedge funds, private equity and real estate investments, for which fair values are estimated as detailed below.

External Investment Pool (PRIT)

PRIT is an external investment pool comprised of securities measured at various fair value measurements. The investment pool is managed by the Pension Reserves Investment Management (PRIM) Board and the System's share of the pool is reported at fair value in the System's financial statements. A complete copy of PRIT's separately issued financial statements can be obtained from PRIM Board at 84 State Street, Boston, MA 02109, or by visiting the PRIM Board's website at <http://www.mapension.com/public-records/records-of-interest/>.

Pooled Equity and Fixed Income Funds, Hedge Funds, Private Equity, and Real Estate Investments

The fair values of these types of investments have been determined by third party investment managers using Net Asset Value (NAV) per share (or its equivalent) on the System's ownership interest in the pool or partner's capital.

**D. Basis of Investment Transactions**

Purchases and sales of investments are recorded on the trade date. Transactions remaining unsettled as of year-end are recorded as payables for securities purchased and as a receivable for securities sold.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
NOTES TO THE FINANCIAL STATEMENTS  
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**E. Contributions and investment income**

Contributions are recognized as additions in the period when they become due pursuant to formal commitments, statutory or contractual requirements. Investment income is recognized when earned.

**F. Benefits and Refunds**

Benefits and refunds to System members and beneficiaries are recognized as deductions when due and payable in accordance with the terms of the System.

**G. Administrative Expenses**

Administrative expenses are financed by investment income.

**H. Due to MWRA**

MWRA pays the System's employees' weekly payroll. At December 31, 2021, no amounts are owed to MWRA from the System for these costs.

**I. Use of Estimates**

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of additions and deductions during the reporting period. Fair values of pooled equity and fixed income funds, real estate funds, private equity funds, and hedge fund investments have been estimated in the absence of readily available fair values, and these estimates may be materially different than values that would have been used had a ready market existed.

**NOTE 2 – PLAN DESCRIPTION**

**A. General**

The System is a single employer public employee retirement system established by the Authority on July 1, 1985, under Massachusetts General Laws (MGL), Chapter 32, and is regulated by the Massachusetts Public Employee Retirement Administration Commission (PERAC). The System is a defined benefit pension plan that covers employees of the Authority.

Membership in the System is mandatory immediately upon the commencement of employment for all permanent full-time employees working at least 18.75 hours weekly.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 NOTES TO THE FINANCIAL STATEMENTS  
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Membership in the System was as follows at December 31, 2021:

Active members.....	1,044
Inactive members.....	143
Retirees and beneficiaries currently receiving benefits.....	763
 Total.....	 1,950

**B. Significant Plan Provisions and Requirements**

Benefit provisions and state law establishes contribution requirements of the System. Members of the System become vested after 10 years of creditable service. Normal retirement occurs at age 65.

For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by (1) the number of years and full months of creditable service at the time of retirement and (2) a percentage based on age at retirement in accordance with a schedule provided by state law. Assuming normal retirement at age 65, this percentage is 2.5%, which is reduced for individuals who retire prior to age 65 to reflect the longer pay out period.

For employees hired on or after April 2, 2012, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by (1) the number of years and full months of creditable service at the time of retirement and (2) a percentage based on age at retirement in accordance with a schedule provided by state law. Assuming normal retirement at age 67, this percentage is 2.5%.

Employees hired prior to April 2, 2012, may elect early retirement after 20 years of service or at any time after attaining age 55 with 10 years of eligible service. Plan members who become permanently and totally disabled may be eligible to receive a disability retirement allowance. The amount of benefits to be received depends on several factors, including the member's age, compensation, veteran status, years of service and whether or not the disability is work-related. In addition, certain death benefits exist for beneficiaries of employees who die in active service.

Under MGL, Chapter 32 Section 3(8)(c), members leaving the Authority's employment to work for other Massachusetts governmental units requires the System transfers their accumulated account balances and creditable service to the retirement system of their new employer. Other such retirement systems are in turn required to make comparable transfers to the System for employees coming to work at the Authority. Per statute, the PERAC actuary shall consider length of service as well as acceptance of military service credit and salary cap provisions if applicable in calculating the liability.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 NOTES TO THE FINANCIAL STATEMENTS  
 DECEMBER 31, 2021

**NOTE 3 – DEPOSITS AND INVESTMENTS**

Investment Policy

Deposits and investments made by the System are governed by Chapter 32 of the MGL. The System has the ability to invest in equity securities, corporate bonds, annuities and other specified investments in accordance with state laws and regulations.

The Board has the authority for establishing and amending investment policy decisions. Based on the investment objectives and constraints of the System, and based on an annual review of the asset allocation and asset classes, the Board will specify a long-term target allocation for each class of permissible assets. These targets will be expressed as a percentage of the total portfolio, and will have ranges surrounding them, allowing for the portfolio to maintain policy through market fluctuations.

The long-term target allocations are intended as strategic goals. Thus, it is permissible for the overall System's asset allocation to deviate from the long-term target, as would likely occur during manager transitions, asset class restructurings, and other temporary changes in the System. Surplus cash flows are utilized to maintain the asset management structure. Should these cash flows not be sufficient to reallocate the plan according to policy, the transfer of assets may occur between managers. At least annually, the Board reevaluates the portfolio weightings by asset class and adjustments are made accordingly. The following identifies the asset allocation policy as of December 31, 2021:

<u>Asset Class</u>	<u>Target</u>	<u>Range</u>
Domestic Equities	31%	10-40%
International Equities	19%	10-30%
Domestic Bonds	24%	15-40%
Real Estate	10%	0-15%
Private Equity	10%	0-15%
Hedge Funds/Absolute Return	6%	0-10%
Cash	0%	0-10%

Rate of Return

For the year ended December 31, 2021, the annual money-weighted rate of return on investments, net of investment expense, was 16.70%. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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Deposits - Custodial Credit Risk

Custodial credit risk for deposits is the risk that, in the event of a bank failure, the System's deposits may not be recovered. The System's policy for custodial credit risk of deposits is to rely on FDIC insurance. As of December 31, 2021, the System was not exposed to custodial credit risk. The carrying value of the System's deposits totaled \$10,000 at December 31, 2021.

Investments Summary

The System's investments at December 31, 2021 are presented below. All investments are presented by investment type, with debt securities presented by maturity (using segmented time distribution).

Investment Type	Total Amount	Investment Maturities (in Years)			
		Less Than 1	1 - 5	6 - 10	More Than 10
<u>Debt Securities:</u>					
Money market mutual funds.....	\$ 19,159,289	\$ 19,159,289	\$ -	\$ -	\$ -
Fixed income securities.....	163,159,104	134,586,769	2,088,409	8,147,113	18,336,813
Total debt securities.....	182,318,393	\$ 153,746,058	\$ 2,088,409	\$ 8,147,113	\$ 18,336,813
<u>Other Investments:</u>					
Equity securities.....	366,452,758				
PRIT (External investment pool).....	33,426,386				
Hedge funds.....	28,070,689				
Real estate.....	59,604,356				
Private equity.....	52,702,977				
Total other investments.....	540,257,166				
Total investments (including cash equivalents).....	\$ 722,575,559				

Investments - Interest Rate Risk of Debt Securities

Interest rate risk for debt securities is the risk that changes in interest rates of debt securities will adversely affect the fair value of an investment. The System's policy for interest rate risk is the duration of the portfolio should be consistent with the appropriate indices. Unless otherwise agreed to, the duration of the portfolio must be within 25% of the appropriate benchmark.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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Investments - Custodial Credit Risk

Custodial credit risk for investments is the risk that, in the event of the failure of the counterparty, the System will not be able to recover the value of its investments or collateral securities that are in the possession of an outside party. The System's policy for custodial credit risk of investments intends that all investments are either insured and/or registered in the name of the System. As of December 31, 2021, the System was not exposed to custodial credit risk.

Investments - Credit Risk of Debt Securities

Credit risk for debt securities is the risk that an issuer or other counterparty to a debt security will not fulfill its obligations. The System's policies for credit risk of debt securities include the minimum quality rating at the time of purchase cannot be below a rating of CCC. Non-rated securities may comprise 10% of the portfolio, provided that the applicable manager determines that, if such an issue was rated, it would be allowed under the above limitation and that the non-rated issue is deemed to be below BAA (investment grade). Compliance with credit ratings provided by Moody's, Standard & Poor's and Fitch is not sufficient for an issue to be deemed an appropriate investment. The managers are responsible for making an independent analysis of the credit-worthiness of securities.

As of December 31, 2021, the credit quality ratings of the System's money market mutual funds are unrated by any nationally recognized statistical rating organization. As of December 31, 2021, the credit quality ratings of the System's fixed income securities, excluding U.S. Treasury securities of \$27,328,253, are as follows:

<u>Quality Ratings *</u>	<u>Fixed Income Securities</u>
A+.....	\$ 780,593
A.....	733,884
A-.....	2,723,406
BBB+.....	6,778,233
Unrated.....	<u>124,814,735</u>
Total.....	<u>\$ 135,830,851</u>

\*Per Standard and Poor's, a nationally recognized statistical rating organization.

Deposits and Investments – Foreign Currency Risk

Foreign currency risk is the risk that fluctuations in exchange rates will adversely affect the fair value of an investment or a deposit. The System does not have a policy regarding foreign currency risk. As of December 31, 2021, the System had indirect exposure to foreign currency risk for certain equity investments issued by foreign countries in the amount of \$131,026,945.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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Investments – Concentration of Credit Risk

Concentration of credit risk is the risk of loss attributed to the magnitude of the System's investment in a single issuer. The System's policy for concentration of credit risk is that not more than 5% of the fair value of the System's portfolio can be invested in the debt obligations of any one issuer, with the exception of securities issued by the U.S. Government, or its agencies, which may be held without limitation. As of December 31, 2021, the System was not exposed to concentration of credit risk.

Fair Value Measurements

The System categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles. The hierarchy is based on the valuation inputs used to measure the fair value of the asset. Level 1 inputs are quoted prices in active markets for identical assets; Level 2 inputs are significant other observable inputs; Level 3 inputs are significant unobservable inputs. The System has the following recurring fair value measurements as of December 31, 2021:

Investments by Fair Value Level	Fair Value	Fair Value Measurements Using	
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)
<u>Debt Securities:</u>			
Money market mutual funds.....	\$ 19,159,289	\$ 19,159,289	\$ -
Fixed income.....	38,344,369	27,328,253	11,016,116
Total Debt Securities.....	57,503,658	46,487,542	11,016,116
<u>Equity Securities:</u>			
Equity securities.....	159,254,266	159,254,266	-
Total Investments by Fair Value Level .....	216,757,924	\$ 205,741,808	\$ 11,016,116
<u>Investments measured at the net asset value (NAV)</u>			
Pooled Equity Funds.....	207,198,492		
Pooled Fixed Income Funds.....	124,814,735		
Private equity.....	52,702,977		
Real estate .....	59,604,356		
Hedge funds.....	28,070,689		
Investments measured at the net asset value (NAV).....	472,391,249		
<u>Other investments measured at fair value</u>			
External investment pool (PRIT) .....	33,426,386		
Total Investments measured at Fair Value .....	\$ 722,575,559		

Debt and equity securities classified in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Equity securities and fixed income securities classified in Level 2 of the fair value hierarchy are valued using a matrix pricing technique. Matrix pricing is used to value securities based on the securities relationship to benchmark quoted prices.

The valuation method for investments measured at the net asset value (NAV) per share (or its equivalent) is presented on the following table.



MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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Investments Measured at the NAV

	Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Private equity (1).....	\$ 52,702,977	27,943,629	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>
Real estate (2).....	59,604,356	4,638,713	N/A <sup>(2)</sup>	N/A <sup>(2)</sup>
Hedge funds (3).....	28,070,689	-	Quarterly	90-100 days
Pooled Equity Funds (4).....	207,198,492	-	1-30 days	1-60 days
Pooled Fixed Income Funds (5).....	<u>124,814,735</u>	-	1-30 days	1-15 days
Total Investments Measured at the NAV.....	<u>\$ 472,391,249</u>			

- (1) Private Equity Funds: This type includes 24 private equity funds that consist primarily of limited partnership interests in corporate finance and venture capital funds. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. The investments can never be redeemed with the funds. Distributions from each of these funds will be received as the underlying investments of the funds are liquidated. It is expected that the underlying assets of the funds will be liquidated over the next 1 to 10 years.
- (2) Real Estate Funds: This type includes 10 real estate funds that invest primarily in U.S. commercial real estate and value-added opportunities. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. There are two investments with approximate values of \$25,600,000 and \$24,500,000 for which the investments can be redeemed quarterly, with a redemption notice period of 90 days. The remaining investments can never be redeemed with the funds. Distributions from each of these funds will be received as the underlying investments of the funds are liquidated. It is expected that the underlying assets of the funds will be liquidated over the next 1 to 12 years.
- (3) Hedge Funds: This type includes 3 hedge funds that pursue multiple strategies to diversify risks and reduce volatility. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. There are three investments with approximate values of \$700,000, \$13,200,000, and \$14,100,000. The investments can be redeemed quarterly, with a redemption notice period of 90 days, 90 days, and 100 days, respectively.
- (4) Pooled Equity Funds: This type includes 7 funds with capital pooled from multiple investors in order to achieve mutual return objectives through investments in various types of equity securities. The fair value of pooled equity funds is measured at NAV by multiplying the pool's share price by the number of shares held.
- (5) Pooled Fixed Income Funds: This type includes 5 funds with capital pooled from multiple investors in order to achieve mutual return objectives through investments in fixed income securities. The fair value of pooled fixed income funds is measured at NAV by multiplying the pool's share price by the number of shares held.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
NOTES TO THE FINANCIAL STATEMENTS  
DECEMBER 31, 2021

**NOTE 4 – FUNDING POLICY**

Chapter 32 of the MGL governs the contributions of plan members and the Authority. Depending on their employment date, active System members must contribute anywhere between 5%-9% of their gross regular compensation. Members hired after December 31, 1978 must contribute an additional 2% of regular compensation in excess of \$30,000. These deductions earn interest at a rate determined by PERAC that vests based upon years of service. The Authority is required to pay into the System 100% of the actuarially determined contribution. For the year ended December 31, 2021, employer contributions totaled \$11,205,000 and plan member contributions totaled \$9,892,233.

Cost-of-living adjustments (COLA's) must be granted by the Board and are the responsibility of the System. COLA may be approved in excess of the Consumer Price Index but not to exceed 3% of the base retirement allowance.

**NOTE 5 – NET PENSION LIABILITY**

The components of the net pension liability of the System at December 31, 2021, were as follows:

Total pension liability.....	\$	748,702,208
Fiduciary net position.....		<u>(728,672,689)</u>
Net pension liability.....	\$	<u><u>20,029,519</u></u>
 Fiduciary net position as a percentage of the total pension liability.....		 97.32%

Actuarial Methods and Assumptions

The total pension liability was determined by an actuarial valuation as of January 1, 2022, which was rolled back to the measurement date of December 31, 2021, using the following actuarial methods and assumptions, which apply to all periods included in the measurement:

Methods:

Actuarial cost method	Entry Age Normal Cost Method
Asset valuation method	Fair Value

Assumptions:

Inflation	3.0%
Salary increases	Based on years of service, ranging from 5.75% at 0 years of service decreasing to 4.00% after 9 years of service
Investment rate of return	6.90%, net of pension plan investment expense, including inflation
Cost of living adjustment	3% of the first \$17,000

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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Mortality rates were based on the following:

Healthy Retiree	Pub-2010 General Employee, Healthy Retiree and Contingent Survivor Amount-Weighted Mortality Tables projected generationally using Scale MP-2021
Disabled Retiree	Pub-2010 General Healthy Retiree Amount-Weighted Mortality Tables set forward one year projected generationally using Scale MP-2021

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension plan's target asset allocation as of December 31, 2021 are summarized in the following table:

Asset Class	Long-Term Expected Real Rate of Return (%)
Domestic equity.....	6.11
International developed markets equity.....	6.49
International emerging markets equity.....	8.12
Core fixed income.....	0.38
High-yield fixed income.....	2.48
Real estate.....	3.72
Hedge fund, global tactical asset allocation, risk parity.....	2.63
Private equity.....	9.93

Discount Rate

The discount rate used to measure the total pension liability was 6.90 percent. The projection of cash flows used to determine the discount rate assumed that plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rates. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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Sensitivity of the Net Pension Liability (Asset) to Changes in the Discount Rate

The following presents the net pension liability of the MWRA calculated using the discount rate of 6.90 percent, as well as what the MWRA's net pension liability (asset) would be if it were calculated using a discount rate that is 1-percentage-point lower (5.90 percent) or 1-percentage-point higher (7.90 percent) than the current rate:

	1% Decrease (5.90%)	Current Discount Rate (6.90%)	1% Increase (7.90%)
Net pension liability (asset).....	\$ 109,511,270	\$ 20,029,519	\$ (55,830,184)

**NOTE 6 – LEGALLY REQUIRED RESERVE ACCOUNTS**

The balances in the System's legally required reserves as of December 31, 2021 are as follows:

Description	Amount	Purpose
Annuity Savings Fund.....	\$ 121,327,327	Active members' contribution balance
Annuity Reserve Fund...	51,585,985	Retired members' contribution account
Military Service Fund.....	149,485	Members' contribution account while on military leave
Pension Reserve Fund...	552,352,412	Amounts appropriated to fund future retirement
Pension Fund.....	3,257,480	Remaining net position
Total.....	\$ 728,672,689	

All reserve accounts are funded at levels required by state law.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 REQUIRED SUPPLEMENTARY INFORMATION  
 DECEMBER 31, 2021

**Schedule of Changes in Employer Net Pension Liability and Related Ratios (1)**

	2021	2020	2019	2018	2017
<b>Total pension liability</b>					
Service cost.....	\$ 14,330,187	\$ 13,338,631	\$ 12,734,657	\$ 11,761,819	\$ 11,307,822
Interest.....	49,158,896	46,455,166	44,061,874	41,391,851	38,520,217
Differences between expected and actual experience.....	(4,886,704)	(263,516)	3,528,888	3,250,413	(145,554)
Changes of assumptions.....	1,161,149	25,031,146	10,507,016	16,401,129	7,977,350
Changes of benefit terms.....	5,567,919	-	-	5,026,543	-
Benefit payments, including refunds of member contributions and net reimbursements and transfers to/from other systems.....	(29,493,631)	(25,313,047)	(24,463,504)	(21,428,414)	(18,222,342)
Net change in total pension liability.....	35,837,816	59,248,380	46,368,931	56,403,341	39,437,493
Total pension liability - beginning.....	712,864,392	653,616,012	607,247,081	550,843,740	511,406,247
Total pension liability - ending (a).....	\$ 748,702,208	\$ 712,864,392	\$ 653,616,012	\$ 607,247,081	\$ 550,843,740
<b>Fiduciary net position</b>					
Contributions - employer.....	\$ 11,205,000	\$ 10,000,000	\$ 7,315,000	\$ 7,000,000	\$ 3,277,369
Contributions - member.....	9,892,233	10,187,970	9,721,334	9,483,873	9,091,378
Net investment income.....	89,018,608	74,947,554	79,556,988	(17,113,462)	70,516,672
Benefit payments, including refunds of member contributions and net reimbursements and transfers to/from other systems.....	(29,493,631)	(25,313,047)	(24,463,504)	(21,428,414)	(18,222,342)
Administrative expense.....	(325,737)	(403,213)	(464,333)	(469,315)	(446,465)
Net change in fiduciary net position.....	80,296,473	69,419,264	71,665,485	(22,527,318)	64,216,612
Fiduciary net position - beginning.....	648,376,216	578,956,952	507,291,467	529,818,785	465,602,173
Fiduciary net position - ending (b).....	\$ 728,672,689	\$ 648,376,216	\$ 578,956,952	\$ 507,291,467	\$ 529,818,785
Net pension liability - ending (a) - (b).....	\$ 20,029,519	\$ 64,488,176	\$ 74,659,060	\$ 99,955,614	\$ 21,024,955
Fiduciary net position as a percentage of the total pension liability.....	97.32%	90.95%	88.58%	83.54%	96.18%
Covered payroll.....	\$ 99,689,252	\$ 102,143,068	\$ 98,145,213	\$ 95,818,684	\$ 92,975,107
Net pension liability as a percentage of covered payroll.....	20.09%	63.14%	76.07%	104.32%	22.61%

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 REQUIRED SUPPLEMENTARY INFORMATION  
 DECEMBER 31, 2021

**Schedule of Changes in Employer Net Pension Liability and Related Ratios (Continued) (1)**

	2016	2015	2014
<u>Total pension liability</u>			
Service cost..... \$	11,079,991	\$ 10,637,880	\$ 10,529,508
Interest.....	36,917,053	34,598,348	33,587,256
Differences between expected and actual experience.....	(9,143,704)	-	(8,379,618)
Changes of assumptions.....	13,298,185	-	4,920,735
Changes of benefit terms.....	2,050,275	-	-
Benefit payments, including refunds of member contributions and net reimbursements and transfers to/from other systems.....	(16,129,253)	(15,389,885)	(12,963,429)
Net change in total pension liability.....	38,072,547	29,846,343	27,694,452
Total pension liability - beginning.....	473,333,700	443,487,357	415,792,905
Total pension liability - ending (a)..... \$	<u>511,406,247</u>	<u>\$ 473,333,700</u>	<u>\$ 443,487,357</u>
<u>Fiduciary net position</u>			
Contributions - employer..... \$	4,632,624	\$ 8,159,521	\$ 12,629,474
Contributions - member.....	8,757,540	8,402,138	8,245,328
Net investment income.....	24,182,878	(530,090)	20,483,877
Benefit payments, including refunds of member contributions and net reimbursements and transfers to/from other systems.....	(16,129,253)	(15,389,885)	(12,963,429)
Administrative expense.....	(426,053)	(412,416)	(407,574)
Net change in fiduciary net position.....	21,017,736	229,268	28,003,676
Fiduciary net position - beginning.....	444,584,437	444,355,169	416,351,493
Fiduciary net position - ending (b)..... \$	<u>465,602,173</u>	<u>\$ 444,584,437</u>	<u>\$ 444,355,169</u>
Net pension liability ending (a) - (b)..... \$	<u>45,804,074</u>	<u>\$ 28,749,263</u>	<u>\$ (867,812)</u>
Fiduciary net position as a percentage of the total pension liability.....	91.04%	93.93%	100.20%
Covered payroll..... \$	89,755,173	\$ 89,168,911	\$ 88,646,339
Net pension liability as a percentage of covered payroll.....	51.03%	32.24%	-0.98%

(1) Data is being accumulated annually to present 10 years of the reported information

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 REQUIRED SUPPLEMENTARY INFORMATION  
 DECEMBER 31, 2021

**Schedule of Employer Contributions**

	<u>2021</u>	<u>2020</u>	<u>2019</u>	<u>2018</u>	<u>2017</u>
Actuarially determined contribution.....	\$ 11,205,000	10,000,000	7,315,000	7,000,000	3,277,369
Contributions in relation to the actuarially determined contribution.....	<u>11,205,000</u>	<u>10,000,000</u>	<u>7,315,000</u>	<u>7,000,000</u>	<u>3,277,369</u>
Contribution deficiency (excess).....	<u>\$ -</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
Covered payroll.....	\$ 99,689,252	102,143,068	98,145,213	95,818,684	92,975,107
Contributions as a percentage of covered payroll.....	11.24%	9.79%	7.45%	7.31%	3.52%
	<u>2016</u>	<u>2015</u>	<u>2014</u>	<u>2013</u>	<u>2012</u>
Actuarially determined contribution.....	\$ 3,132,624	8,159,521	7,808,155	5,918,931	5,765,956
Contributions in relation to the actuarially determined contribution.....	<u>4,632,624</u>	<u>8,159,521</u>	<u>12,629,474</u>	<u>12,447,338</u>	<u>10,490,247</u>
Contribution deficiency (excess).....	<u>\$ (1,500,000)</u>	<u>-</u>	<u>(4,821,319)</u>	<u>(6,528,407)</u>	<u>(4,724,291)</u>
Covered payroll.....	\$ 89,755,173	89,168,911	88,646,339	84,829,033	84,829,033
Contributions as a percentage of covered payroll.....	5.16%	9.15%	14.25%	14.67%	12.37%

**Schedule of Investment Returns (1)**

Year-Ended:	Annual Money-Weighted Rate of Return, Net of Investment Expense
2021	16.70%
2020	12.78%
2019	15.58%
2018	-10.03%
2017	15.02%
2016	5.81%
2015	-0.24%
2014	4.40%

(1) Data is being accumulated annually to present 10 years of the reported information

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
NOTES TO REQUIRED SUPPLEMENTARY INFORMATION  
DECEMBER 31, 2021

**Changes of Assumptions**

The mortality table projection schedule was updated to MP-2021.

The administrative expense assumption was increased from \$550,000 for calendar 2021 to \$575,000 for calendar 2022.

The System increased the cost-of-living adjustment base from \$15,000 to \$17,000. This change increased the unfunded liability by approximately \$5.6 million and increased the normal cost by approximately \$0.1 million.

**Methods and Assumptions Used in Calculations of Actuarially Determined Contributions**

Actuarial Valuation:

The actuarially determined contribution rates are calculated as of January 1, 2020, two years prior to the end of the fiscal year which contributions are reported.

Methods:

Actuarial cost method	Entry Age Normal Cost Method
Asset valuation method	Fair Value

Assumptions:

Inflation	3.0%
Salary increases	Based on years of service, ranging from 5.75% at 0 years of service decreasing to 4.00% after 9 years of service
Investment rate of return	7.10%, net of pension plan investment expense, including inflation
Cost of living adjustment	3% of the first \$14,000

In addition, mortality rates were based on the following:

Pre-Retirement	RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017
Healthy Retiree	RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2017
Disabled Retiree	RP-2014 Blue Collar Healthy Annuitant Mortality Tables set forward one year projected generationally using Scale MP-2017



MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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**Schedule of Administrative Expenses**

The composition of administrative expenses for the year ended December 31, 2021 is as follows:

Personal services	
Salaries	<u>\$ 191,231</u>
Professional services	
Legal expenses	12,650
Medical expenses	103
Professional services	585
Actuarial Services	24,500
Accounting Services	<u>25,000</u>
Total Professional Services	<u>62,838</u>
Other Expenses	
Fiduciary insurance	13,725
Service contracts	35,700
Education and training	600
Administrative expenses	13,202
Furniture and equipment	<u>8,442</u>
Total other expenses	<u>71,668</u>
Total Expenses	<u><u>\$ 325,737</u></u>

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 SUPPLEMENTARY INFORMATION  
 DECEMBER 31, 2021

**Schedule of Investment and Consultants' Expenses**

Total Balanced		
PRIM General Allocation Account	\$	25,056
Large Cap Domestic Equity		
Coho		238,183
Polen		302,178
Rhumbline S&P 500		28,542
Small Cap Domestic Equity		
Loomis Sayles		112,050
Robeco		240,676
International Equity		
SEG Baxter Street		424,671
Fixed Income		
Entrust		6,360
Garcia Hamilton		96,971
Invesco Mortgage Recovery AIV		8
Invesco Mortgage Recovery II		10,709
Loomis Sayles Fixed Income		160,322
PRIT Hedge		157,334
Rhumbline US TIPS		8,213
UBS		55,255
Real Estate		
Cerberus		128,027
Stepstone Real Estate Global Fund II		9,573
Landmark VIII		56,848
Morgan Stanley Prime Property		251,326
TA Realty Fund X		1,447
TA Core Realty		152,280
TerraCap III		(47,314)
TerraCap IV		389,376
Private Equity		
Alcentra		16,134
Ascent V		2,476
Ascent VI		18,750
CarVal		381,471
Constitution		83,548
Foundry 2007		68,843
Foundry 2010		1,084,925
Hamilton Lane		227,311
Harbourvest		87,260
Invesco VI		190,229
J.F. Lehman IV		11,617
J.F. Lehman V		118,342
Kayne Anderson		3,564
Landmark XV		18,285
Park Square		35,269
Pinebridge		627
PRIT VY 2008		2,412
PRIT VY 2009		534
PRIT VY 2010		2,959
PRIT VY 2011		9,815
PRIT VY 2012		7,016
PRIT VY 2014		16,830
PRIT VY 2017		30,757
PRIT VY 2020		52,517
PRIT VY 2021		17,869
PA Capital (formerly Private Advisors)		110,224
TOTAL INVESTMENT MANAGEMENT FEES		<u>5,407,672</u>
CUSTODIAL FEES		
People's United Bank		116,245
CONSULTANT FEES		
NEPC		<u>120,000</u>
TOTAL ALL INVESTMENT-RELATED FEES	\$	<u><u>5,643,917</u></u>



## Investment Section

## REPORT ON INVESTMENT ACTIVITY

The information contained in the Investment Section of the Annual Comprehensive Financial Report (ACFR) has been prepared by NEPC, LLC, acting as the investment consultant for the Massachusetts Water Resources Authority (MWRA) Employees' Retirement System (the 'System'). All investment information herein has been reconciled between the MWRA, the investment managers hired by the MWRA, MWRA's custodian, and NEPC.

### OUTLINE OF INVESTMENT POLICIES

The purpose of this document is to set forth the goals and objectives for the explicit purpose of:

- Determining the System's projected financial needs,
- Expressing the Board's position with respect to its risk/reward posture,
- Formulating an appropriate set of goals and objectives for the System's assets,
- Defining the strategy to be implemented by the Board in the endeavor of achieving the goals and objectives,
- Identifying a set of guidelines that the consultant can use in formulating corresponding investment recommendations over the next ten-year time horizon, and
- Establishing procedures and a schedule for monitoring the performance of the System in achieving the stated objectives.

### I. MWRA Employees' Retirement System Goals

The MWRA Employees' Retirement System is an employee pension plan established in accordance with Chapter 32 of Massachusetts General Laws ('M.G.L., Chapter 32'). The System and Funds are administered by a Retirement Board (the 'Board') consisting of five members: the Ex-Officio, two appointed members, and two members elected by the general membership of the retirement system. This defined benefit plan is maintained to provide retirement, disability, and/or death benefits, as the case may be, to participants in accordance with Massachusetts General Laws.

The Board of the MWRA Employees' Retirement System has as its primary goal to provide promised benefits to participants and beneficiaries of the system. Plan assets should be equal to or greater than the present value of the projected benefit obligations ('fully funded'). When Plan assets are less than the present value of projected benefit obligations, a schedule will be established, and a plan will be in place to meet a fully funded status.

### II. Investment Objectives

The investment goal of the fund is to achieve the assumed rate of return over the long term, through a prudently diversified portfolio. In order to achieve needed returns within the stated risk tolerance and in order to diversify plan assets so as to minimize the risk associated with the independence on the success of one enterprise, a policy asset mix will be utilized.

#### **A. Risk and Return Objectives**

- To use diversification to minimize the risk of large losses associated with the dependence on the success of one enterprise
- The Board has determined that investment growth should be maintained in such a manner that the minimum nominal rate of return does not cause a negative real rate of return over a full market cycle.
- Return volatility of the aggregate asset base of the System will be measured relative to the volatility experienced by a policy benchmark.
- Volatility or risk shall be measured as the annualized standard deviation, utilizing monthly and/or quarterly total rates of return of the aggregate assets of the System.

### **III. Investment Constraints**

#### **A. Legal and Regulatory**

The System is a qualified defined benefit pension plan governed by the M.G.L., Chapter 32.

The Board is charged by law with the responsibility for the investment of the assets of the System. To assist the Board in meeting their fiduciary obligation, they are authorized and permitted by the Public Employee Retirement Administration Commission (PERAC) to engage the services of advisors who possess the necessary specialized research facilities and skilled manpower to assure adherence to the 'Prudent Expert Rule' under such statutes as may now or in the future apply to investments of the System. Legal counsel will be retained by the Trustees to review contracts and provide overall advice as to fiduciary compliance to regulatory authorities.

Assets of this Fund shall be invested in a manner consistent with the fiduciary standards established under Code of Massachusetts Regulations 840 ('840 CMR'). The Board shall also use as precedent the Employee Retirement Income Security Act (ERISA).

Every Fiduciary Shall:

- Discharge his or her duties for the exclusive purpose of providing benefits to the participants of the Plan and their beneficiaries.
- Act with the care, skill, prudence, and diligence under the circumstances then prevailing that a prudent person acting in a like capacity and familiar with such matters would use in the conduct of an enterprise of like character and with like aims.
- Diversify by investment of the Plan so as to minimize the risk of large losses unless under the circumstances it is clearly prudent not to do so.
- Operate in accordance with the MWRA Employees' Retirement System's procedures, documents, and instruments.
- Maintain compliance with the Code of Ethics and Standards of Conduct applicable to their assigned duties.

No Fiduciary Shall:

- Deal with the assets of the MWRA Employees' Retirement System for his or her own account or his or her own interest.

- Act in any manner or on behalf of any person or organization whose interests are adverse to the interests of the MWRA Employees' Retirement System, its members, or beneficiaries.
- Cause the MWRA Employees' Retirement System to engage in a transaction which in any way involves a sale, exchange, lease, or transfer of assets to or from, or the use of assets by or for the benefit, or the furnishing of goods, services, or facilities to or by, or the lending of money or extension of credit to or by any party in one's own interest.

#### **B. Time Horizon**

Return assumptions will be based on a ten year time horizon, with a review and analysis to be made at least annually to monitor allocations and assumptions. Should a manager deviate from proscribed mandate or expected risk and return profile by a consequential degree, that manager may be reevaluated at any time.

#### **C. Liquidity**

Presently, contributions exceed plan withdrawals to provide benefits, payouts, and/or plan expenses. Portfolio liquidity will be managed based on the cash flow needs of the System.

#### **D. Tax Considerations**

The System is a tax-exempt entity. Therefore, investments and strategies will be evaluated only on the basis of expected risks and potential returns.

### **IV. Risk and Return Considerations**

When achieving return objectives required to fully fund the system, the Board is intent on controlling risk. Consistency of returns and risk of loss are primary considerations.

The Board also has determined that the annual performance of plan assets should not vary substantially from returns achieved by other public pension funds with similar goals and objectives.

### **V. Diversification**

The System's aggregate equity portfolio (including international equity and emerging market securities) will be diversified by market capitalization, industry, number of issues, and rate of turnover. The System's aggregate fixed income portfolio will be diversified by quality ratings, maturity schedule, industry, number of issues, and rate of turnover. The System's aggregate Global Asset Allocation portfolio allows for enhanced diversification through exposure to new asset categories, enhanced return and reduced volatility in down markets. The System's aggregate real estate portfolio will be invested in both equity and debt, and diversified geographically, by property type, by manager, and by investor. The System's aggregate private equity portfolio will be invested in private equity partnerships, private equity limited liability companies, and discretionary managers investing in private equity partnerships and private equity limited liability companies. The System's aggregate hedge fund portfolio will provide diversified and uncorrelated investments, which will include a broad array of strategies utilizing both liquid and illiquid securities.

The specific degrees of diversification within the above asset classes will be addressed in each manager's investment guidelines.

## VI. Asset Allocation

To achieve needed returns within the stated risk tolerance, and to diversify plan assets so as to minimize the risk associated with the dependence on the success of one enterprise, a policy asset mix will be utilized. To accommodate the growth and avoid excess trading costs, the Board also has implemented asset class ranges.

In developing this asset mix, no portion of the portfolio has been allocated to cash. However, when employing a multi-manager investment approach, managers may raise cash balances in accordance with their individual investment guidelines.

### A. Permissible Asset Classes

The Board has specifically indicated those asset classes that may be utilized when investing the System's assets, which are summarized as follows:

Asset Type	Asset Class	Purpose
Equity	Large Cap U.S. Stocks	Total Return Potential
Equity	Small Cap U.S. Stocks	Total Return Potential
Equity	Developed International Stocks	Total Return Potential Diversification
Equity	Emerging Markets Stocks	Total Return Potential Diversification
Equity	Private Equity	Total Return Potential Diversification
Fixed Income	Investment Grade Bonds	Return Stability Income
Fixed Income	High Yield Bonds	Total Return Potential Diversification Income
Fixed Income	Non-U.S. Bonds	Total Return Potential Diversification Income
Real Estate	Real Estate	Total Return Potential Diversification Income
Hedge Funds	Absolute Return Strategies	Return Stability Diversification

## B. Expected Returns, Risks, and Correlations for Permissible Asset Classes

The risk and return behavior of the System will be driven primarily by the allocation of investments across asset classes. In determining the appropriate allocation, the expected return and risk behavior of each asset class and the likely interaction of various asset classes in a portfolio must and are examined.

## C. Long-Term Target Allocations

Based on the investment objectives and constraints of the MWRA Retirement System, and based on an annual review of the asset allocation and asset classes, the Board will specify a long term target allocation for each class of permissible assets. These targets will be expressed as a percentage of the total portfolio, and will have ranges surrounding them, allowing for the portfolio to maintain policy through market fluctuations.

The long term target allocations are intended as strategic goals. Thus, it is permissible for the overall System's asset allocation to deviate from the long term target, as would likely occur during manager transitions, asset class restructurings, and other temporary changes in the MWRA Retirement System. Deviations from targets that occur due to capital market changes are discussed after the following table:

Asset Allocation Targets  
as of 12/31/21

	<b>Target (%)</b>	<b>Range (%)</b>
<b>Domestic Stocks<sup>1</sup></b>	<b>31%</b>	<b>10-40%</b>
<b>International Stocks<sup>2</sup></b>	<b>19%</b>	<b>10-30%</b>
<b>Domestic Bonds<sup>3</sup></b>	<b>24%</b>	<b>15-40%</b>
<b>Real Estate</b>	<b>10%</b>	<b>0-15%</b>
<b>Private Equity</b>	<b>10%</b>	<b>0-15%</b>
<b>Hedge Funds</b>	<b>6%</b>	<b>0-10%</b>
<b>Cash</b>	<b>0%</b>	<b>0-10%</b>

<sup>1</sup> Includes large and small cap stocks

<sup>2</sup> Includes developed and emerging markets

<sup>3</sup> Includes high yield and non-U.S. bond holdings



#### **D. Rebalancing**

Surplus cash flows shall be utilized to maintain the asset management structure. Should these cash flows not be sufficient to reallocate the Plan according to the policy, the transfer of assets may occur between managers.

#### **E. Changes to Asset Allocation**

At least annually, the Board will reevaluate the portfolio weightings by asset class and adjustments shall be made accordingly.

### **VII. Review of Investment Policy, Asset Allocation, and Performance**

Policy guidelines will be fixed annually by the Board after consideration of the advice and recommendations of the consultant. All modifications of policy guidelines shall be in writing and signed by each of the acting Board members.

### **VIII. Trading and Proxy Voting by Investment Managers**

All transactions are to be governed by negotiation for execution on a 'best execution basis.' The lowest commission cost may not represent the best execution. Investment managers shall be responsible for determining best execution of trades within their assigned portfolio.

Proxy voting shall be implemented by the manager in compliance to policies established by the manager approved by the Board as well as policies included in the investment policy statement. The manager is to report on all votes that are cast and the reason behind their decisions on a semi-annual basis.

### **IX. Management Structure**

To diversify the System's assets so as to minimize the risk associated with dependence on the success of one enterprise, the Board has decided to employ a multi-manager team approach to investing System assets.

A consultant will be employed whose fiduciary responsibilities will be to provide investment advice, including: 1) risk and return assumptions on investments, 2) diversification of System assets so as to minimize risk, while attempting to achieve the System's return objectives, and 3) evaluating, monitoring, and reporting the total portfolio and investment manager returns and compliance to policy guidelines. The consultant is responsible for monthly and quarterly reporting.

Asset managers will be employed to utilize individual expertise within their assigned area of responsibility. Each manager will be governed by individual investment guidelines.

The Board, in recognition of the benefits of commingled funds (i.e., the ability to diversify more extensively than in a small, direct investment account and the lower costs which can be associated with these funds) may elect to invest in such funds on a case-by-case basis. The Board recognizes that it cannot give specific policy directives to a commingled fund with pre-established policies, outlined in each fund's prospectus or offering documents; therefore, the Board is relying on the investment consultant to assess and monitor the investment policies of any funds used by the Fund to ascertain whether they are appropriate for the System. The Board and its Investment Managers, where applicable, will establish a Side Letter Agreement that sets forth that the manager is aware of the Code of Massachusetts Regulations, Investment Regulations, the applicable provisions of the M.G.L., Chapter 32 and that the Manager will comply with the statute and Investment Regulations wherever possible, consistent with the Manager's trust documents, prospectus, implementation documents, etc. creating the commingled fund vehicle.

## X. Implementation

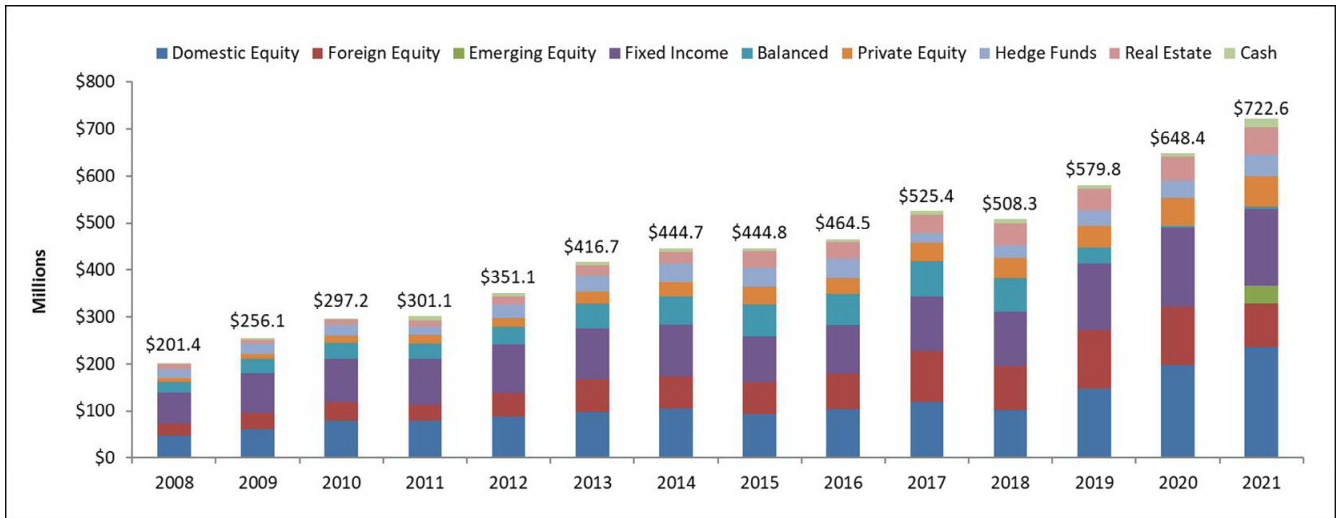
All monies invested for the Board by investment managers after the adoption of this investment policy statement shall conform to this statement. To the extent that the Board shall deliver to an investment manager, in cash or kind, or fund assets here to fore invested for them by other investment managers, within 60 days after the delivery of said prior assets by the Board, the entire portfolio managed by the manager shall conform in all aspects to guidelines established to the investment guidelines established for said manager.

### TIME-WEIGHTED INVESTMENT RESULTS<sup>4</sup> PERIODS ENDING 12/31/21

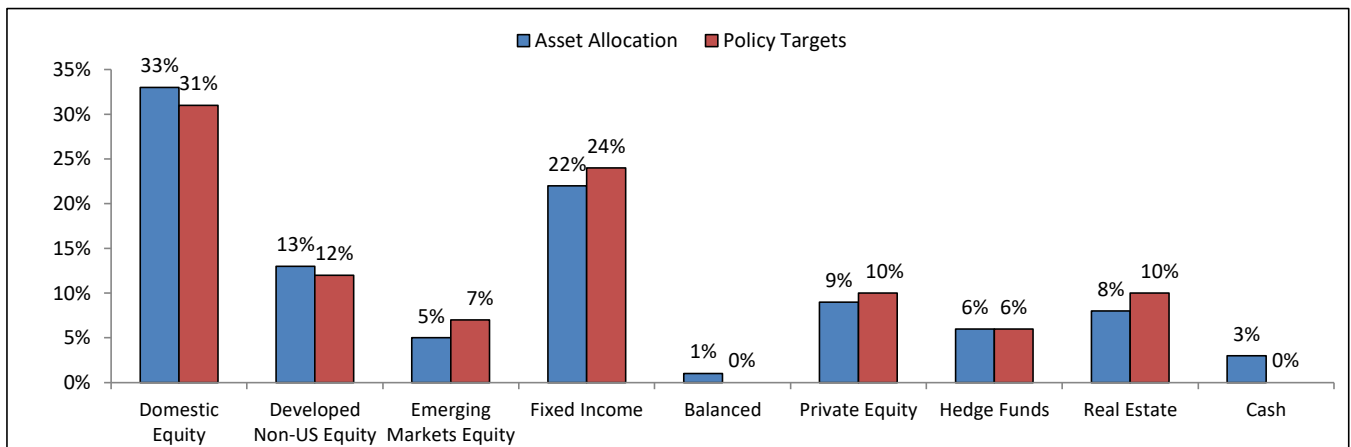
	4Q21	1 YR	3 YR	5 YR	10 YR	Since Inception	Inception Date
<b>Total Composite</b>	<b>3.8</b>	<b>13.4</b>	<b>14.0</b>	<b>10.6</b>	<b>9.2</b>	<b>7.2</b>	<b>1/1/1986</b>
Allocation Index	4.0	14.0	14.2	10.7	9.2	--	
Policy Index	4.7	15.2	15.4	11.3	9.6	--	
<b>Total Balanced</b>	<b>5.4</b>	<b>19.9</b>	<b>13.6</b>	<b>9.3</b>	<b>6.9</b>	<b>6.0</b>	<b>12/1/2010</b>
60% MSCI ACWI (Net) / 40% FTSE WGBI	3.6	7.8	13.4	10.0	7.6	7.1	
<b>Total Domestic Equity</b>	<b>7.9</b>	<b>23.2</b>	<b>24.4</b>	<b>17.9</b>	<b>15.6</b>	<b>8.5</b>	<b>5/1/1999</b>
Russell 3000	9.3	25.7	25.8	18	16.3	8.1	
<b>Total Non-US Equity</b>	<b>-0.1</b>	<b>2.4</b>	<b>12.8</b>	<b>9.9</b>	<b>6.9</b>	<b>4.9</b>	<b>3/1/1999</b>
MSCI EAFE	2.7	11.3	13.5	9.5	8.0	4.9	
<b>Total Fixed Income</b>	<b>0.2</b>	<b>0.4</b>	<b>6.5</b>	<b>4.7</b>	<b>4.9</b>	<b>6.4</b>	<b>3/1/1999</b>
Bloomberg Aggregate	0.0	-1.5	4.8	3.6	2.9	4.2	
<b>Total Hedge Fund</b>	<b>0.9</b>	<b>8.1</b>	<b>7.8</b>	<b>5.2</b>	<b>4.9</b>	<b>3.8</b>	<b>10/1/2006</b>
HFRI Fund of Funds Composite Index	0.4	6.2	8.5	5.7	4.6	7.3	
<b>Total Real Estate</b>	<b>8.6</b>	<b>24.1</b>	<b>11.1</b>	<b>10.0</b>	<b>11.5</b>	<b>8.4</b>	<b>4/1/1999</b>
NCREIF Property Index	6.2	17.7	8.4	7.8	9.3	8.9	
<b>Total Private Equity</b>	<b>5.6</b>	<b>43.4</b>	<b>20.1</b>	<b>17.5</b>	<b>15.6</b>	<b>10.8</b>	<b>4/1/1999</b>
C A US All PE	5.4	38.7	24.2	20.0	16.4	13.8	
<b>Cash</b>	<b>0.0</b>	<b>0.0</b>	<b>1.1</b>	<b>1.3</b>	<b>0.7</b>	<b>1.8</b>	<b>12/1/2010</b>
91 Day T-Bills	0.0	0.0	0.8	1.1	0.6	1.5	

<sup>4</sup> Net of fees

### HISTORICAL ASSET ALLOCATION - ASSET SIZE

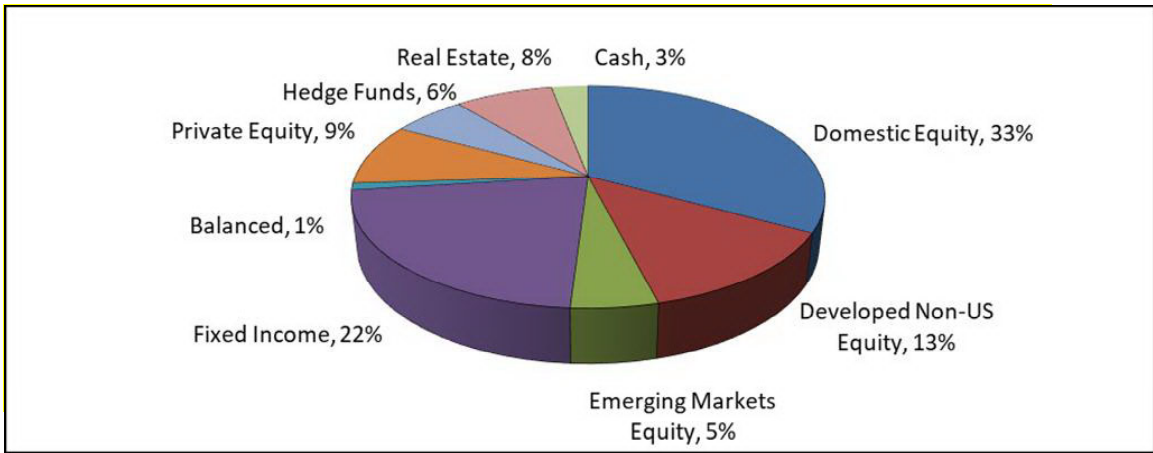


### AGGREGATE ASSET ALLOCATION VS. POLICY TARGETS<sup>5</sup>

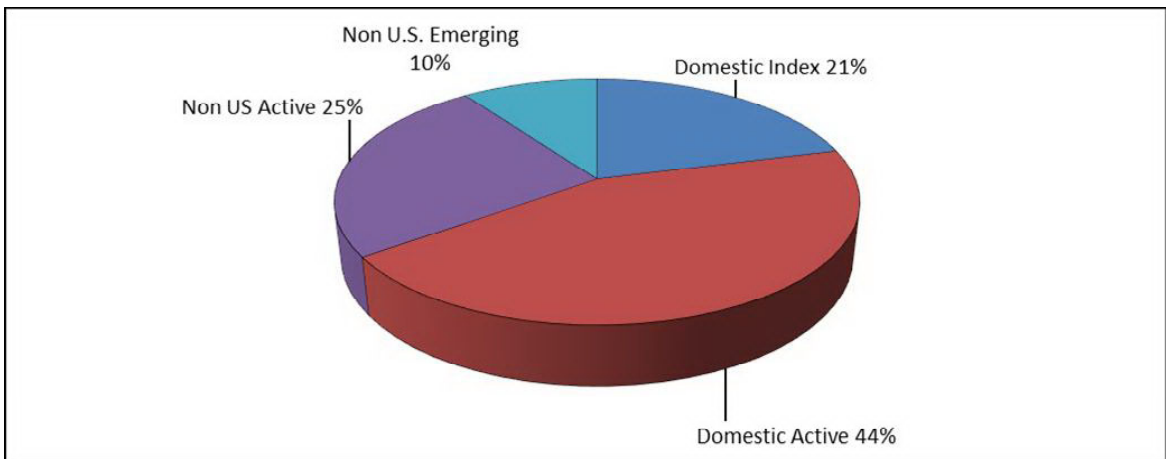


<sup>5</sup> Percentages may not sum to 100% due to rounding.

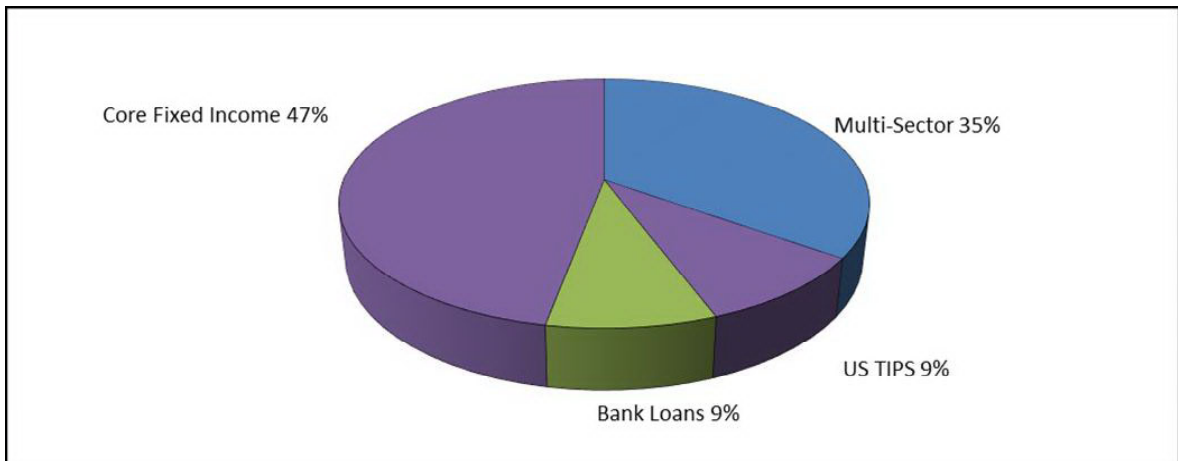
### AGGREGATE ASSET ALLOCATION<sup>6</sup>



### EQUITY ALLOCATION<sup>1</sup>



### FIXED INCOME ALLOCATION<sup>1</sup>



<sup>6</sup> Percentages may not sum to 100% due to rounding.

**TEN LARGEST STOCK HOLDINGS BY FAIR VALUE**

<b>Company</b>	<b>Number of Shares</b>	<b>Fair Value (\$MM)</b>	<b>Percentage of Domestic Stock</b>	<b>Industry</b>
APPLE INC	29,296.98	\$5.2	2.2%	Information Technology
AMAZON.COM INC	28,659.49	\$4.8	2.0%	Consumer Discretionary
MICROSOFT CORP	14,112.71	\$4.7	2.0%	Information Technology
ALPHABET INC	1,301.00	\$3.8	1.6%	Communication Services
META PLATFORMS INC	10,014.00	\$3.4	1.4%	Communication Services
UNITEDHEALTH GROUP INC	6,190.72	\$3.1	1.3%	Health Care
LOWE'S COS INC	11,796.61	\$3.0	1.3%	Consumer Discretionary
ABBOTT LABORATORIES	21,431.00	\$3.0	1.3%	Health Care
CVS HEALTH CORP	26,962.08	\$2.8	1.2%	Health Care
MASTERCARD INC	7,611.00	\$2.7	1.1%	Information Technology

**LARGEST FIXED INCOME HOLDINGS BY FAIR VALUE**

<b>Security</b>	<b>Market Value (\$mm)</b>	<b>% of Bonds</b>
1 Garcia Hamilton Fixed Income Aggregate	38.8	23.7%
2 Loomis Sayles Fixed Income	56.8	34.7%
3 Rhumblin TIPS	15.3	9.4%
4 Lord Abbett Core Fixed Income	38.4	23.5%
5 Octagon Senior Secured Credit Cayman	14.2	8.7%

A complete portfolio is available upon request.

**2021 SCHEDULE OF FEES & COMMISSIONS**

<b>2021 Investment Manager Fees</b>	
<b>Manager</b>	<b>Fee</b>
ABS	\$0.00
Alcentra (in liquidation)	\$16,133.96
Ascent II (in liquidation)	\$0.00
Ascent IV	\$0.00
Ascent IV-B	\$0.00
Ascent V	\$2,476.00
Ascent VI	\$18,750.00
Axiom	\$0.00
Baillie Gifford	\$0.00
Boston Company (acct closing, residual bal.)	\$0.00
CarVal	\$381,471.00
Castile (in liquidation)	\$0.00
Cerberus	\$128,027.00
Coho	\$238,183.44
Constitution Ironsides	\$83,547.90
Corbin Pinehurst	\$0.00
Entrust	\$6,359.53
Foundry 2007	\$68,843.00
Foundry 2010	\$886,542.00
Foundry 2010 Annex	\$198,383.00
Garcia Hamilton	\$96,971.15
Hamilton Lane V	\$227,311.00
Harbourvest Dover X	\$87,260.00
Hartford Schroders	\$0.00
Invesco IV (in liquidation)	\$0.00
Invesco Mortgage Recovery AIV	\$8.00
Invesco Mortgage Recovery II	\$10,709.00
Invesco VI	\$190,229.00
J.F. Lehman IV	\$11,617.00
J.F. Lehman V	\$118,342.00
Kayne Anderson	\$3,564.00
Landmark VI	\$0.00
Landmark VIII	\$56,847.64
Landmark XV	\$18,284.72
Loomis Sayles Sall Cap	\$112,050.11
Loomis Sayles Fixed Income FDT	\$160,322.08
Lord Abbett	\$0.00
Morgan Stanley Prime Property	\$251,325.97
Octagon	\$0.00
Park Square	\$35,269.00
Pinebridge	\$627.00
Polen Capital	\$302,177.61
PRIT General Allocation	\$25,055.87
PRIT Hedge Funds	\$157,334.06
PRIT VY2008	\$2,412.22
PRIT VY2009	\$534.15
PRIT VY2010	\$2,959.45

PRIT VY2011	\$9,815.33
PRIT VY2012	\$7,015.73
PRIT VY2014	\$16,829.50
PRIT VY2017	\$30,756.57
PRIT VY2020	\$52,516.63
PRIT VY2021	\$17,868.78
Private Advisors(PA Capital)	\$110,224.00
Real Estate Global Partnership II (Stepstone)	\$9,573.00
Rhumblin S&P 500	\$28,542.00
Rhumblin US TIPS Trust	\$8,213.00
Robeco	\$240,675.96
SEG Baxter Street Fund	\$424,670.55
TA Realty Fund X	\$1,447.00
TA Core Realty	\$152,279.63
Terracap III	-\$47,314.00
Terracap IV	\$389,375.73
UBS	\$55,254.70
<b>Total Investment Manager Fees</b>	<b>\$ 5,407,671.97</b>
NEPC (Consultant Fee)	\$120,000.00
People's United Bank (Custodial Bank Fee)	\$116,244.64
<b>Total All Investment-Related Fees</b>	<b>\$5,643,916.61</b>
Plus Administrator Expenses	\$325,736.78
<b>Total All Investment-Related Fees</b>	<b>\$5,969,653.39</b>

**2021 COMMISSIONS TO BROKERS**

<b>Broker Name</b>	<b>Total Commissions (\$)</b>	<b>Total Shares</b>	<b>%/Share</b>
BAIRD, ROBERT W & CO INC, MILWAUKEE	428.08	11,485.00	2.08
BARCLAYS CAPITAL INC./LE, NEW JERSEY	526.82	17,114.00	1.05
BARCLAYS CAPITAL LE, NEW YORK	342.08	8,676.00	0.39
BERNSTEIN SANFORD C & CO, NEW YORK	1,721.41	63,548.00	2.80
BMO CAPITAL MARKETS CORP, NEW YORK	133.66	6,683.00	0.24
BTIG LLC, NEW YORK	75.78	2,305.00	0.16
CANTOR CLEARING SERV, NEW YORK	0.28	14.00	0.02
CANTOR FITZGERALD & CO INC, NEW YORK	3.60	180.00	0.02
CITIGROUP GLOBAL MARKETS, INC., NEW YORK	306.77	9,482.00	0.94
CLSA AMERICAS, NEW YORK	54.90	1,830.00	0.12
COWEN AND CO LLC, NEW YORK	142.12	3,553.00	0.48
COWEN AND COMPANY, LLC, JERSEY CITY	872.64	28,015.00	4.03
CREDIT SUISSE, NEW YORK (CSUS)	4,098.74	138,374.00	5.82
GOLDMAN SACHS & CO, NY	967.28	39,274.00	3.12
GUGGENHEIM CAPITAL MARKETS LLC, NEW YORK	15.16	379.00	0.04
HSBC BROKERAGE (USA) INC., NEW YORK	5.04	126.00	0.04
INSTINET CLEARING SER INC, NEW YORK	152.44	6,094.00	1.18
INSTINET CORP, NEW YORK	1.44	144.00	0.04
INVESTMENT TECH GROUP INC, NEW YORK	55.73	2,226.00	0.93
ISI GROUP INC, NEW YORK	0.68	17.00	0.04
ITG INC, NEW YORK	44.04	2,591.00	0.41
J.P MORGAN SECURITIES INC, NEW YORK	324.98	12,982.00	1.61
J.P. MORGAN SECURITIES LLC, NEW YORK	476.52	18,004.00	1.38
JEFFERIES & CO INC, NEW YORK	1,014.82	38,082.00	2.29
JONESTRADING INST SVCS LLC, NEW YORK	756.55	36,050.00	0.55
KEEFE BRUYETTE + WOODS INC, NEW YORK	176.36	4,409.00	0.88
LEERINK SWANN AND COMPANY, NEW YORK	29.76	744.00	0.12
LIQUIDNET INC, NEW YORK	435.66	17,571.00	2.52
LUMINEX TRADING AND ANALYTICS, BOSTON	121.93	5,596.00	0.65
MERGER	-	9,043.85	-
MERRILL LYNCH PIERCE FENNER SMITH INC NY	1,100.44	61,606.00	3.72
MIZUHO SECURITIES USA, INC., NEW YORK	19.88	497.00	0.12
MORGAN STANLEY & CO INC, NY	1,661.07	112,003.00	4.35
NAME CHANGE	-	7,544.00	-
NATIONAL FINL SVCS CORP, NEW YORK	916.41	27,138.00	2.26
NEEDHAM AND CO LLC, NEW YORK	9.52	238.00	0.08
OPPENHEIMER & CO INC, NEW YORK	889.52	32,364.00	1.74
PERSHING LLC, JERSEY CITY	102.46	5,123.00	0.18
PIPER JAFFRAY & CO., JERSEY CITY	60.74	1,620.00	0.36
RAYMOND JAMES & ASSOC INC, ST PETERSBURG	816.34	35,610.00	1.06
RBC CAPITAL MARKETS LLC, NEW YORK	1,988.08	67,375.00	5.34
SPINOFF	-	1,806.50	-
STIFEL NICOLAUS	425.28	18,330.00	0.90
STOCK SPLIT	-	15,907.00	-
UBS SECURITIES LLC, STAMFORD	287.29	9,736.00	1.53
VIRTU AMERICAS LLC, NEW YORK	42.83	1,711.00	0.60
WELLS FARGO SECURITIES, LLC, NEW YORK	381.24	9,531.00	0.04
WILLIAM BLAIR & CO, CHICAGO	184.48	4,795.00	1.02
<b>TOTAL</b>	<b>22,170.85</b>	<b>897,526.35</b>	<b>-</b>



## 2021 INVESTMENT SUMMARY<sup>7</sup>

	Market Value 12/31/2021 (\$mm)	% of Asset Class	% of System
<b>Total System</b>	<b>722.6</b>	<b>NA</b>	<b>100%</b>
<b>Total Domestic Equity Assets</b>	<b>235.4</b>	<b>100%</b>	<b>33%</b>
Info. Tech.	60.0	25.5%	8.4%
Health Care	43.8	18.6%	6.1%
Financials	24.5	10.4%	3.4%
Cons. Disc.	31.8	13.5%	4.4%
Industrials	21.2	9.0%	3.0%
Comm. Svc.	19.1	8.1%	2.7%
Cons. Staples	18.4	7.8%	2.5%
Energy	5.2	2.2%	0.8%
Unclassified	3.5	1.5%	0.5%
Materials	3.5	1.5%	0.5%
Real Estate	2.6	1.1%	0.4%
Utilities	1.8	0.8%	0.3%
<b>Total Foreign Equity Assets</b>	<b>131.0</b>	<b>100%</b>	<b>18%</b>
Europe-Developed	56.0	42.7%	7.7%
Pacific Rim/Australia Asia-Developed	13.5	10.3%	1.9%
Emerging Markets	54.5	41.6%	7.5%
Unclassified	0.2	0.2%	0.0%
North America	6.8	5.2%	0.9%
<b>Total Fixed Income Assets</b>	<b>163.2</b>	<b>100%</b>	<b>22%</b>
U.S. Treasury/Agency	80.9	49.6%	11.0%
Corporate	64.9	39.8%	8.9%
Asset Backed	9.6	5.9%	1.3%
Mortgage Backed	2.8	1.7%	0.3%
Foreign	1.0	0.6%	0.1%
Other	3.5	2.1%	0.3%
Muni	0.5	0.3%	0.1%
<b>Total Alternative Assets</b>	<b>173.8</b>	<b>100%</b>	<b>24%</b>
Private Equity	65.4	37.6%	9.0%
Real Estate	59.5	34.2%	8.2%
Hedge Funds	43.4	25.0%	6.0%
Balanced	5.5	3.2%	0.8%
<b>Cash &amp; Cash Equivalents</b>	<b>19.2</b>	<b>100%</b>	<b>3%</b>

<sup>7</sup> Numbers may not sum to 100% due to rounding.

## LIQUIDITY PROFILE

Benefits payments totaled approximately \$31.5 million during the year and along with other payments of \$0.3 million resulted in total cash outflows of \$31.8 million in 2021. These payments were partially offset by contributions of approximately \$21.0 million from employers and plan members and other cash receipts of \$2.1 million for a total of \$23.1 million in 2021. This resulted in a negative cash flow of approximately \$8.7 million for the fiscal year. Note that these figures do not incorporate expected income and asset gains from the MWRA's investments. The MWRA's portfolio is structured with a long-term expected return of 6.90%<sup>8</sup>.

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<sup>8</sup> As of 12/31/21. Long-term expected return changed to 7.0% as of 03/01/22.



## Actuarial Section



Lisa VanDermark, FSA, MAAA, EA  
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Boston, MA 02116-5744  
segalco.com

August 31, 2022

Massachusetts Water Resources Authority Employees' Retirement Board  
MWRA Chelsea Facility  
Two Griffin Way  
Chelsea, MA 02150

Dear Board Members:

Segal has performed a January 1, 2022 actuarial valuation of the Massachusetts Water Resources Authority Employees' Retirement System. This is the most recent actuarial valuation and has been completed in accordance with generally accepted actuarial principles and practices. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate. Further, in our opinion, the assumptions as approved by the Retirement Board are reasonably related to the experience of and the expectations for the plan.

As part of performing the valuation, Segal was furnished member data by the Massachusetts Water Resources Authority Employees' Retirement System's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary. In addition, the administrative staff furnished financial statements that were not audited by the actuary.

The funding objective of the plan is to provide for the current cost of benefits (*i.e.*, normal cost) and to reduce the unfunded liability to zero by June 30, 2030. The normal cost is expected to remain at a level percentage of payroll. The unfunded liability is amortized over a 8-year period with the appropriation increasing 12.05% per year.

Valuations have been performed either annually or biennially. Biennial valuations are consistent with the guidelines promulgated by PERAC and GASB. Annual valuations provide the Retirement Board with information more quickly and allows for faster response to changes in circumstances. The previous valuation was performed as of January 1, 2021. The assumptions and methods used for funding purposes meet the parameters set by Actuarial Standards of Practice (ASOPs).

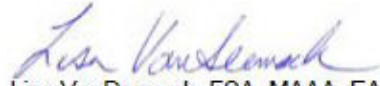
Segal has prepared, and included as part of this report, the following supporting schedules for the Actuarial Section of the December 31, 2021 Annual Comprehensive Financial Report:

- I. Summary of Actuarial Assumptions and Actuarial Cost Method
- II. Schedule of Active Member Valuation Data
- III. Schedule of Retirees and Beneficiaries Added to and Removed from Rolls
- IV. Solvency Test
- V. Analysis of Financial Experience
- VI. Summary of Plan Provisions

Massachusetts Water Resources Authority Employees' Retirement Board  
August 31, 2022

Please let us know if you have any questions on this material.

Sincerely,

  
Lisa VanDermark, FSA, MAAA, EA  
Vice President and Consulting Actuary

## I. Summary of Actuarial Assumptions and Actuarial Cost Method

The actuarial assumptions, as set forth in the accompanying supporting schedules, were selected by the Massachusetts Water Resources Authority Employees' Retirement Board. Unless stated otherwise, the actuarial assumptions are based upon the actuarial valuation as of January 1, 2022.

### Mortality Rates

*Healthy:* Pub-2010 General Employee, Healthy Retiree and Contingent Survivor Amount-Weighted Mortality Tables projected generationally using Scale MP-2021

*Disabled:* Pub-2010 General Healthy Retiree Amount-Weighted Mortality Tables set forward one year projected generationally using Scale MP-2021

The underlying tables reasonably reflect the mortality experience of the System as of the measurement date. These mortality tables were then adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

The mortality rates were based on historical and current data, adjusted to reflect estimated future experience and professional judgement.

### Termination Rates before Retirement

Age	Rate (%)		
	Mortality		
	Male	Female	Disability
20	0.04	0.01	0.01
25	0.03	0.01	0.02
30	0.04	0.02	0.03
35	0.05	0.02	0.06
40	0.07	0.04	0.10
45	0.10	0.06	0.15
50	0.15	0.08	0.19
55	0.22	0.12	0.24
60	0.32	0.19	0.28

**Notes:**

Mortality rates do not reflect generational projection.

55% of the disability rates shown represent accidental disability.

40% of the accidental disabilities will die from the same cause as the disability.

55% of the death rates shown represent accidental death.

## Withdrawal Rates

Years of Service	Rate per year (%)
0	15.0
1	12.0
2	10.0
3	9.0
4	8.0
5	7.6
6	7.5
7	6.7
8	6.3
9	5.9
10	5.4
11	5.0
12	4.6
13	4.1
14	3.7
15	3.3
16 – 20	2.0
21 – 29	1.0
30+	0.0

The withdrawal and disability rates were based on historical and current data, adjusted to reflect estimated future experience and professional judgment.

## Retirement Rates

Age	Rate per year (%)			
	Members Hired Before April 2, 2012		Members Hired On or After April 2, 2012	
	Male	Female	Male	Female
50	0.750	1.125	0	0
51	0.750	1.125	0	0
52	0.750	1.500	0	0
53	0.750	1.875	0	0
54	1.500	1.875	0	0
55	1.500	4.125	0	0
56	1.875	4.875	0	0
57	1.875	4.875	0	0
58	3.750	4.875	0	0
59	4.875	4.875	0	0

Age	Rate per year (%)			
	Members Hired Before April 2, 2012		Members Hired On or After April 2, 2012	
	Male	Female	Male	Female
60	9.000	3.750	15.000	6.250
61	15.000	9.750	15.000	9.750
62	22.500	11.250	22.500	11.250
63	18.750	9.375	18.750	9.375
64	16.500	13.500	16.500	13.500
65	30.000	11.250	30.000	11.250
66	18.750	15.000	18.750	15.000
67	18.750	15.000	18.750	15.000
68	22.500	18.750	22.500	18.750
69	22.500	15.000	22.500	15.000
70	100.000	100.000	100.000	100.000

The retirement rates were based on historical and current data, adjusted to reflect estimated future experience and professional judgment.

### Retirement Age for Inactive Vested Participants

Age 55.

The retirement age for inactive vested participants was based on historical and current data, adjusted to reflect estimated future experience and professional judgment.

### Unknown Data for Participants

Same as those exhibited by participants with similar known characteristics.

### Family Composition:

80% of participants are assumed to be married. Females are assumed to be three years younger than their spouses.

### Benefit Election

All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.

### Net Investment Return

6.90%



## Salary Increases

Years of Service	Rate (%)
0	5.75%
1	5.25%
2	5.25%
3	5.00%
4	5.00%
5	4.50%
6	4.50%
7	4.25%
8	4.25%
9+	4.00%

Includes allowance for wage inflation of 3.00%.

The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment.

## Interest on Employee Contributions

3.50%

## Administrative Expenses

\$575,000 for calendar 2022, increasing 3.00% per year.

## Total Service

Total creditable service reported in the data.

## Net 3(8)(c) Liability

Estimated based on anticipated net 3(8)(c) payments and average characteristics of retired participants and beneficiaries.

## Actuarial Value of Assets

Market value of assets as reported in the System's Annual Statement less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 10% of the market value.

## Actuarial Cost Method

Entry Age Normal Actuarial Cost Method. Entry Age is the age of the participant less Total Service as defined above. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal Cost is determined using the plan of benefits applicable to each participant.

## Amortization Method

The employer contribution is set to \$12,555,203 for fiscal 2023 and increases 12.05% per year for fiscal 2023 through fiscal 2029 with a 14.81% decrease in fiscal 2030 to fully fund the System by June 30, 2030.

## Recent Changes

The following changes were reflected in the January 1, 2015 valuation:

- The net investment return assumption was lowered from 8.00% to 7.75%.
- The administrative expense assumption was increased from \$390,000 for calendar 2013 to \$525,000 for calendar 2015.
- The pre-retirement mortality assumption was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally from 2005 with Scale AA.
- The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2005 with Scale AA.
- The mortality assumption for disabled participants was changed from the RP-2000 Mortality Table set forward 2 years projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward 2 years projected generationally from 2005 with Scale AA.
- The retirement rates were reduced by 25%.
- The salary increase assumption was changed as follows:

Years of Service	Rate (%)	
	Current	Previously
0	6.00	7.00
1	5.50	6.50
2	5.50	6.50
3	5.25	6.00
4	5.25	6.00
5	4.75	5.50
6	4.75	5.50
7	4.50	5.00
8	4.50	5.00
9+	4.25	4.75

- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from \$5.2 million to \$7.2 million based on the average net 3(8)(c) payments in 2013 and 2014.

The following changes were effective January 1, 2017:

- The net investment return assumption was lowered from 7.75% to 7.50%.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected generationally from 2005 with Scale AA to the RP-2000 Employee Mortality Table projected generationally from 2009 with Scale BB2D.

- The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2005 with Scale AA to the RP-2000 Employee Mortality Table projected generationally from 2009 with Scale BB2D.
- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward 2 years projected generationally from 2005 with Scale AA to the RP-2000 Employee Mortality Table projected generationally from 2015 with Scale BB2D.
- The salary increase assumption was changed as follows:

Years of Service	Rate (%)	
	Current	Previously
0	5.75	6.00
1	5.25	5.50
2	5.25	5.50
3	5.00	5.25
4	5.00	5.25
5	4.50	4.75
6	4.50	4.75
7	4.25	4.50
8	4.25	4.50
9+	4.00	4.25

- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from \$7.2 million to \$8.7 million based on the average net 3(8)(c) payments in 2015 and 2016.

The following changes were effective January 1, 2018:

- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected generationally from 2009 with Scale BB2D to the RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017.
- The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Annuitant Mortality Table projected generationally from 2009 with Scale BB2D to the RP-2014 Blue Collar Annuitant Mortality Table projected generationally with Scale MP-2017.
- The mortality assumption for disabled participants was changed from the RP-2000 Annuitant Mortality Table projected generationally from 2015 with Scale BB2D to the RP-2014 Blue Collar Annuitant Mortality Table set forward 1 year projected generationally with Scale MP-2017.
- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from \$8.7 million to \$9.3 million based on the average net 3(8)(c) payments in 2016 and 2017.

The following changes were effective January 1, 2019:

- The net investment return assumption was lowered from 7.50% to 7.25%.
- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from \$9.3 million to \$9.7 million based on the average net 3(8)(c) payments in 2017 and 2018.

The following changes were effective January 1, 2020:

- The net investment return assumption was lowered from 7.25% to 7.10%.

- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from \$9.7 million to \$10.1 million based on the average net 3(8)(c) payments in 2018 and 2019.

The following changes were effective January 1, 2021:

- A one-year floor was placed on the actuarial value of assets equal to 97.0% of the market value of assets.
- The net investment return assumption was lowered from 7.10% to 6.90%.
- The mortality assumption for healthy participants was changed from the RP-2014 Blue Collar Employee and Healthy Annuitant Mortality Tables set forward one year for female participants, projected generationally using Scale MP-2017 to the Pub-2010 General Employee, Healthy Retiree and Contingent Survivor Amount-weighted Mortality Tables projected generationally using Scale MP-2020.
- The mortality assumption for disabled participants was changed from the RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year projected generationally using Scale MP-2017 to the Pub-2010 General Disabled Retiree Amount-weighted Mortality Tables set forward one year, projected generationally using Scale MP-2020.
- The retirement rates for members hired on or after April 2, 2012 at age 60 were increased from 9.0% for males and 3.75% for females to 15.0% and 6.25%, respectively.
- The administrative expense assumption was increased from \$525,000 for calendar 2020 to \$550,000 for calendar 2021.
- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from \$10.1 million to \$11.3 million based on average net 3(8)(c) disbursements and average characteristics of retired participants and beneficiaries.

The following changes were effective January 1, 2022:

- The mortality table projection scale was updated to MP-2021.
- The administrative expense assumption was increased from \$550,000 for calendar 2021 to \$575,000 for calendar 2022.

## II. Schedule of Active Member Valuation Data

Valuation date	Number	Projected annual payroll (\$)	Annual average pay (\$)	% Increase in average pay per year
1/1/2010	1,108	\$81,962,000	\$73,973	--
1/1/2011	1,110	82,870,000	74,658	0.93
1/1/2013	1,091	84,829,033	77,753	2.05
1/1/2015	1,090	89,168,911	81,806	2.57
1/1/2017	1,095	93,569,377	85,451	2.20
1/1/2018	1,100	96,767,777	87,971	2.95
1/1/2019	1,109	99,700,988	89,902	2.20
1/1/2020	1,105	102,150,661	92,444	2.83
1/1/2021	1,103	106,332,975	96,403	4.28
1/1/2022	1,044	103,781,925	99,408	3.12

## III. Schedule of Retirees and Beneficiaries Added to and Removed from Rolls

Year ended <sup>1</sup>	Added to Rolls		Removed from Rolls		Rolls at end of year		Average annual allowances	% Increase in average annual allowances
	Number	Annual Allowances <sup>2</sup>	Number	Annual Allowances	Number	Annual Allowances <sup>2</sup>		
2012	61	\$2,380,699	5	\$61,467	397	\$11,069,722	\$27,883	--
2014	91	3,658,868	12	251,979	476	14,581,693	30,634	9.9
2016	80	3,727,766	20	532,663	536	17,977,080	33,539	9.5
2017	53	2,310,558	7	248,508	582	20,234,689	34,768	3.7
2018	51	2,805,364	8	208,025	625	23,031,639	36,851	6.0
2019	54	2,906,730	7	146,076	672	26,098,021	38,836	5.4
2020	40	2,368,729	10	228,794	702	28,452,673	40,531	4.4
2021	79	5,058,972	18	596,963	763	33,055,200	43,323	6.9

<sup>1</sup> Actuarial valuations were not performed using data for the years ended 2011, 2013 and 2015 and that data is not available. Data is being accumulated annually to present the required ten years of information.

<sup>2</sup> Annual allowances are shown for retirees and beneficiaries in pay status at the end of the year.

## IV. Solvency Test

Valuation Date <sup>1</sup>	Actuarial Accrued Liability			Actuarial value of assets	Portion of Actuarial Accrued Liability Covered by Assets		
	(1) Active/Inactive member contributions	(2) Retirees and beneficiaries	(3) Active/Inactive members (Employer financed)		(1)	(2)	(3)
1/1/2013	\$108,978,697	\$106,973,144	\$169,344,232	\$341,515,023	100	100	74
1/1/2015	111,917,112	142,899,213	188,871,032	435,841,439	100	100	96
1/1/2017	118,789,289	179,180,324	213,436,634	493,403,059	100	100	92
1/1/2018	120,629,588	204,979,899	225,234,253	523,135,101	100	100	88
1/1/2019	121,569,575	241,010,131	244,667,375	541,622,416	100	100	73
1/1/2020	122,967,810	274,214,884	256,433,318	566,190,373	100	100	66
1/1/2021	126,370,266	301,307,811	285,186,315	628,924,930	100	100	71
1/1/2022	121,041,709	354,770,931	272,889,568	666,688,320	100	100	70

<sup>1</sup> Actuarial valuations were not performed as of January 1, 2012, 2014 or 2016 and that data is not available. Data is being accumulated annually to present the required ten years of information.

## V. Analysis of Financial Experience

	Year Ended December 31				
	2021	2020	2019	2018	2017
1. Unfunded actuarial accrued liability as of January 1	\$83,939,463	\$87,425,639	\$65,624,665	\$27,708,639	\$18,003,188
2. Normal cost as of January 1	14,880,187	13,863,631	13,259,657	12,286,819	11,832,822
3. Employer and employee contributions during year	(21,087,233)	(20,187,970)	(17,036,335)	(16,483,873)	(12,368,747)
4. Interest					
(a) For whole year on (1) + (2)	6,818,556	7,191,538	5,719,113	2,999,659	2,237,700
(b) For half year on (3)	<u>(659,162)</u>	<u>(648,815)</u>	<u>(558,950)</u>	<u>(559,235)</u>	<u>(419,625)</u>
(c) Total interest	\$6,159,394	\$6,542,723	\$5,160,163	\$2,440,424	\$1,818,075
5. Expected unfunded actuarial accrued liability	83,881,811	87,644,023	67,008,150	25,952,009	19,285,338
6. Actual unfunded actuarial accrued liability	82,013,888	83,939,462	87,425,639	65,624,665	27,708,639
7. Increase/(decrease) in unfunded liability versus expected: (6) – (5)	<u>(\$1,867,923)</u>	<u>(\$3,704,561)</u>	<u>\$20,417,489</u>	<u>\$39,672,656</u>	<u>\$8,423,301</u>
(a) Investment (gain) or loss	(\$3,390,620)	(\$10,134,111)	\$6,522,100	\$15,130,942	\$736,876
(b) (Gains) or losses from sources other than investments	(5,206,371)	(476,123)	3,388,373	3,114,042	(290,925)
(c) Plan changes	5,587,919	--	--	5,026,543	--
(d) Assumption and method changes	1,161,149	6,905,673	10,507,016	16,401,129	7,977,350

## VI. Summary of Plan Provisions

The following summarizes the major provisions of Chapter 32 of the Massachusetts General Laws.

### Plan Year

January 1 – December 31

### Retirement Benefits

Employees covered by the Contributory Retirement Law are classified into one of four groups depending on job classification. Group 1 comprises most positions in state and local government. It is the general category of public employees. Group 4 comprises mainly police and firefighters. Group 2 is for other specified hazardous occupations. (Officers and inspectors of the State Police are classified as Group 3.)

For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following table based on the age of the member at retirement:

Age Last Birthday at Date of Retirement			
Percent	Group 1	Group 2	Group 4
2.5	65 or over	60 or over	55 or over
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	--	49
1.8	58	--	48
1.7	57	--	47
1.6	56	--	46
1.5	55	--	45

A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last three years of creditable service prior to retirement.



For employees hired on April 2, 2012 or later, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following tables based on the age and years of creditable service of the member at retirement:

For members with less than 30 years of creditable service:			
Age Last Birthday at Date of Retirement			
Percent	Group 1	Group 2	Group 4
2.50	67 or over	62 or over	57 or over
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

For members with 30 years of creditable service or greater:			
Age Last Birthday at Date of Retirement			
Percent	Group 1	Group 2	Group 4
2.500	67 or over	62 or over	57 or over
2.375	66	61	56
2.250	65	60	55
2.125	64	59	54
2.000	63	58	53
1.875	62	57	52
1.750	61	56	51
1.625	60	55	50

A member's final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement.

For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). In addition, regular compensation for members who retire after April 2, 2012 will be limited to prohibit "spiking" of a member's salary to increase the retirement benefit.

For all employees, the maximum annual amount of the retirement allowance is 80 percent of the member's final three-year average salary. Any member who is a veteran also receives an additional yearly retirement allowance of \$15 per year of creditable service, not exceeding \$300. The veteran allowance is paid in addition to the 80 percent maximum.

## **Employee Contributions**

Employees hired before January 1, 1975 contribute 5 percent of their salary; employees hired after January 1, 1975 and before December 31, 1983 contribute 7 percent; employees hired after January 1, 1984 and before June 30, 1996 contribute 8 percent; employees hired after July 1, 1996 contribute 9 percent.

In addition, employees hired after December 31, 1978 contribute an additional 2 percent of salary in excess of \$30,000.

Employees hired after 1983 who leave with less than five years of credited service receive no interest on their contributions, and employees who leave with five but less than ten years receive one-half the rate of regular interest otherwise payable. Commencing July 1, 2010, employees who voluntarily terminate employment, who have less than 10 years of service and request a refund, receive 3% interest on their contributions.

Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%.

## **Retirement Benefits (Superannuation)**

Members of Group 1, 2 or 4 hired prior to April 2, 2012 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

Members hired prior to April 2, 2012 who terminate before age 55 with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System).

Members of Group 1 hired April 2, 2012 or later may retire upon the attainment of age 60. Members of Group 2 or 4 hired April 2, 2012 or later may retire upon the attainment of age 55. Members of Group 4 may retire upon attainment of age 50 with ten years of creditable service.

Members hired April 2, 2012 or later who terminate before age 55 (60 for members of Group 1) with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (60 for members of Group 1) provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System.

## **Ordinary Disability Benefits**

A member who is unable to perform his job due to a non-occupational disability will receive a retirement allowance if he has ten or more years of creditable service and has not reached age 55. The annual amount of such allowance shall be determined as if the member retired for superannuation at age 55 (age 60 for Group 1 members hired on or after April 2, 2012), based on the amount of creditable service at the date of disability. For veterans, there is a minimum benefit of 50 percent of the member's most recent year's pay plus an annuity based on his or her own contributions.

## **Accidental Disability Benefit**

For a job-connected disability, the benefit is 72 percent of the member's most recent annual pay plus an annuity based on his own contributions, plus additional amounts for surviving children. Benefits are

capped at 75 percent of annual rate of regular compensation for employees who become members after January 1, 1988.

## **Death Benefits**

In general, the beneficiary of an employee who dies in active service will receive a refund of the employee's own contributions. Alternatively, if the employee were eligible to retire on the date of his or her death, a spouse's benefit will be paid equal to the amount the employee would have received under Option C. The surviving spouse of a member who dies with two or more years of credited service has the option of a refund of the employee's contributions or a monthly benefit regardless of eligibility to retire, if they were married for at least one year. The allowance provided for under this option shall not be less than \$500 per month, and there are additional amounts for surviving children.

If an employee's death is job-connected, the spouse will receive 72 percent of the member's most recent annual pay in addition to a refund of the member's accumulated deductions, plus additional amounts for surviving children. However, in accordance with Section 100 of Chapter 32, the surviving spouse of a police officer, firefighter or corrections officer is killed in the line of duty will be eligible to receive an annual benefit equal to the maximum salary held by the member at the time of death, and will be eligible for pay increases that would have been awarded to the officer if they were still living.

Upon the death of a job-connected disability retiree who retired prior to November 7, 1996 and could not elect an Option C benefit, a surviving spouse will receive an allowance of \$9,000 if the member dies for a reason unrelated to the cause of disability.

## **"Heart and Lung Law" and Cancer Presumption**

Any case of hypertension or heart disease resulting in total or partial disability or death to a uniformed fireman or permanent member of a police department, or certain employees of a county correctional facility is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. Any case of disease of the lungs or respiratory tract resulting in total disability or death to a uniformed fireman is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. There is an additional presumption for uniformed firemen that certain types of cancer are job-related if onset occurs while actively employed or within five years of retirement.

## **Options**

Members may elect to receive a full retirement allowance payable for life under Option A. Under Option B a member may elect to receive a lower monthly allowance in exchange for a guarantee that at the time of death contributions not expended for annuity payments will be refunded to his beneficiary. Option C allows the member to take a lesser retirement allowance in exchange for providing a survivor with two-thirds of the lesser amount. Option C pensioners will have their benefits converted from a reduced to a full retirement if the beneficiary predeceases the retiree.

## **Post-Retirement Benefits**

The Board has adopted the provisions of Section 51 Chapter 127 of the Acts of 1999, which provide that the Retirement Board may approve an annual COLA in excess of the Consumer Price Index but not to exceed a 3% COLA on the first \$17,000 of a retirement allowance.

## Changes in Plan Provisions

The COLA based was increased from \$15,000 to \$17,000.

## VII. Schedules of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (A)	Actuarial Accrued Liability (AAL) Entry Age (B)	Unfunded AAL (UAAL) (B-A)	Funded Ratio (A/B)	Covered Payroll (C)	UAAL as a Percentage of Covered Payroll ((B-A)/C)
01/01/22	\$ 666,688,320	\$ 748,702,208	\$ 82,013,888	89.05%	\$ 99,689,252	82.3%
01/01/21	628,924,930	712,864,392	83,939,462	88.23%	102,143,068	82.2%
01/01/20	566,190,373	653,616,012	87,425,639	86.62%	98,145,213	89.1%
01/01/19	541,622,416	607,247,081	65,624,665	89.19%	95,818,684	68.5%
01/01/18	523,135,101	550,843,740	27,708,639	94.97%	92,975,107	29.8%
01/01/17	493,403,059	511,406,247	18,003,188	96.48%	89,755,173	20.1%
01/01/15	435,841,439	443,487,357	7,645,918	98.28%	88,646,339	8.6%
01/01/13	341,515,023	385,296,073	43,781,050	88.64%	84,829,033	51.6%
01/01/11	299,331,000	341,521,000	42,190,000	87.65%	82,870,000	50.9%
01/01/10	276,270,000	319,876,000	43,606,000	86.37%	81,962,000	53.2%

Please refer to the ten-year schedule of employer contributions (page 35) included in the required supplementary information for a comparison between actuarially determined contributions and contributions made.



## Statistical Section

## Statistical Section

This part of the Massachusetts Water Resources Authority Employees' Retirement System's Annual Comprehensive Financial Report presents information as a context for understanding what the information in the financial statements, note disclosures, and required supplementary information says about the Massachusetts Water Resources Authority Employees' Retirement System's overall financial health

	Page
<b>Financial Trends</b>	75-76
These schedules contain trend information to help the reader understand how the Massachusetts Water Resources Employees' Retirement System's financial performance and well-being have changed over time.	
<b>Schedule of Retired Members by Type of Benefit</b>	77
This schedule presents trend data about retired members by type of benefit.	
<b>Schedule of Average Benefit Payments</b>	78
These schedules present trend data about average benefit payments.	

**Schedule of Additions to Fiduciary Net Position by Source (a)**

<u>Year</u>	<u>Plan Member Contributions</u>	<u>Employer Contributions</u>	<u>Investment Income (b)</u>	<u>Other (c)</u>	<u>Total</u>
2012	\$ 7,855,760	12,341,893	38,698,894	938,285	59,834,832
2013	7,948,445	12,447,338	56,951,114	1,018,293	78,365,190
2014	8,245,328	12,645,474	20,483,877	1,123,092	42,497,771
2015	8,402,138	8,159,521	(530,090)	1,331,481	17,363,050
2016	8,757,540	4,632,624	24,182,878	1,422,400	38,995,442
2017	9,091,378	3,277,369	70,516,672	1,747,392	84,632,811
2018	9,483,873	7,000,000	(17,113,462)	1,715,689	1,086,100
2019	9,721,334	7,315,000	79,556,988	1,955,313	98,548,635
2020	10,187,970	10,000,000	74,947,554	2,095,914	97,231,438
2021	9,892,233	11,205,000	89,018,608	1,994,403	112,110,244

(a) Information derived from audited financial statements (2012 - 2021)

(b) Net of investment expenses

(c) Includes reimbursements and transfers of employees' contributions from other public pension systems

**Schedule of Deductions from Fiduciary Net Position by Type (a)**

<u>Year</u>	<u>Benefits</u>	<u>Refunds</u>	<u>Sub-total</u>	<u>Administrative Expenses</u>	<u>Reimbursements and Transfers to Other Systems</u>	<u>Total</u>
2011	\$ 10,279,649	223,082	10,502,731	383,802	244,310	11,130,843
2012	11,773,192	72,299	11,845,491	410,778	622,410	12,878,679
2013	13,614,473	262,148	13,876,621	407,574	209,900	14,494,095
2015	15,385,334	412,481	15,797,815	412,416	923,551	17,133,782
2016	17,052,150	270,000	17,322,150	426,054	229,502	17,977,706
2017	19,143,991	280,035	19,424,026	446,465	545,708	20,416,199
2018	22,150,657	502,246	22,652,903	469,315	491,200	23,613,418
2019	24,777,652	884,188	25,661,840	464,333	756,977	26,883,150
2020	26,889,083	259,266	27,148,349	403,213	260,612	27,812,174
2021	30,547,357	453,226	31,000,583	325,737	487,451	31,813,771

(a) Information derived from audited financial statements (2012 - 2021)

**Schedule of Total Change in Fiduciary Net Position (a)**

<u>Year</u>	<u>Total Change in Fiduciary Net Position</u>
2012	\$ 48,703,989
2013	65,486,511
2014	28,003,676
2015	229,268
2016	21,017,736
2017	64,216,612
2018	(22,527,318)
2019	71,665,485
2020	69,419,264
2021	80,296,473

(a) Information derived from audited financial statements (2012 -2021)

**Schedule of Benefit Expenses by Type (a)**

<u>Year ended December 31</u>	<u>Regular* (\$)</u>	<u>Disability* (\$)</u>	<u>Beneficiary* (\$)</u>	<u>Annuities (\$)</u>	<u>Total (\$)</u>
2012	\$ 5,626,480	1,709,728	637,994	2,305,447	10,279,649
2013	6,681,557	1,768,654	685,929	2,637,052	11,773,192
2014	7,817,352	1,832,978	758,469	3,205,675	13,614,473
2015	8,682,348	2,092,721	897,682	3,712,583	15,385,334
2016	9,776,498	2,162,420	992,623	4,120,609	17,052,150
2017	11,277,050	2,203,053	1,037,932	4,625,956	19,143,991
2018	12,868,039	2,673,196	1,212,779	5,396,643	22,150,657
2019	13,879,390	2,972,891	1,803,750	6,121,621	24,777,652
2020	15,197,653	3,108,635	2,020,514	6,562,281	26,889,083
2021	17,648,684	3,209,707	2,151,728	7,537,238	30,547,357

\*COLA included in pension benefits

(a) Source: MWRA ERS Staff



### Schedule of Retired Members by Type of Benefit (b)(c)

	12/31/2021	12/31/2020	12/31/2019	12/31/2018	12/31/2017	12/31/2016
<b>Superannuation</b>						
Under \$10,000	6	6	8	9	9	9
\$10,000 - \$19,999	58	59	65	75	74	77
\$20,000 - \$29,999	109	109	113	112	113	112
\$30,000 - \$39,999	84	90	93	88	85	75
\$40,000 - \$49,999	98	91	85	73	69	57
\$50,000 - \$59,999	72	57	47	39	31	29
\$60,000 - \$69,999	53	44	35	28	25	18
\$70,000 - \$79,999	55	36	30	24	18	17
\$80,000 & over	55	39	33	26	17	11
<b>Total</b>	<b>590</b>	<b>531</b>	<b>509</b>	<b>474</b>	<b>441</b>	<b>405</b>
<b>Ordinary Disability</b>						
Under \$10,000	0	1	1	2	1	1
\$10,000 - \$19,999	5	4	4	3	4	4
\$20,000 - \$29,999	2	2	3	3	3	3
\$30,000 - \$39,999	3	4	5	5	5	5
\$40,000 - \$49,999	2	1	0	0	0	0
\$50,000 - \$59,999	1	1	1	1	1	1
\$60,000 - \$69,999	0	0	0	0	0	0
\$70,000 - \$79,999	0	0	0	0	0	0
\$80,000 & over	0	0	0	0	0	0
<b>Total</b>	<b>13</b>	<b>13</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>14</b>
<b>Accidental Disability</b>						
Under \$10,000	0	0	0	0	0	0
\$10,000 - \$19,999	0	0	0	1	1	0
\$20,000 - \$29,999	5	4	5	5	5	6
\$30,000 - \$39,999	13	14	14	14	15	17
\$40,000 - \$49,999	24	24	22	21	21	17
\$50,000 - \$59,999	14	14	14	11	8	8
\$60,000 - \$69,999	3	3	3	2	2	1
\$70,000 - \$79,999	0	0	1	1	0	0
\$80,000 & over	2	2	1	1	0	0
<b>Total</b>	<b>61</b>	<b>61</b>	<b>60</b>	<b>56</b>	<b>52</b>	<b>49</b>
<b>Beneficiaries</b>						
Under \$10,000	9	8	9	12	11	12
\$10,000 - \$19,999	37	37	37	32	33	29
\$20,000 - \$29,999	29	29	26	23	19	16
\$30,000 - \$39,999	12	14	9	8	8	6
\$40,000 - \$49,999	9	8	7	5	4	4
\$50,000 - \$59,999	1	0	0	0	0	0
\$60,000 - \$69,999	2	1	1	1	0	0
\$70,000 - \$79,999	0	0	0	0	0	1
\$80,000 & over	0	0	0	0	0	0
<b>Total</b>	<b>99</b>	<b>97</b>	<b>89</b>	<b>81</b>	<b>75</b>	<b>68</b>
<b>Total Retired Members</b>						
Under \$10,000	15	15	18	23	21	22
\$10,000 - \$19,999	100	100	106	111	112	110
\$20,000 - \$29,999	145	144	147	143	140	137
\$30,000 - \$39,999	112	122	121	115	113	103
\$40,000 - \$49,999	133	124	114	99	94	78
\$50,000 - \$59,999	88	72	62	51	40	38
\$60,000 - \$69,999	58	48	39	31	27	19
\$70,000 - \$79,999	55	36	31	25	18	18
\$80,000 & over	57	41	34	27	17	11
<b>Total</b>	<b>763</b>	<b>702</b>	<b>672</b>	<b>625</b>	<b>582</b>	<b>536</b>

(b) Source: Segal Consulting

(c) This table provides for the most comprehensive average benefit payment data available. Data is being accumulated annually to present the required ten years of information.

**Schedule of Retired Members by Years of Credited Service (d)(e)**

Years of Credited Service	2021			2020			2019		
	Average Monthly Benefit (\$)	Final Average Salary (\$)	Number of Retired Members	Average Monthly Benefit (\$)	Final Average Salary (\$)	Number of Retired Members	Average Monthly Benefit (\$)	Final Average Salary (\$)	Number of Retired Members
0 - 5	1,962	43,099	7	1,878	40,642	9	1,851	40,642	9
5 - 10	2,117	47,950	16	2,155	45,317	15	2,123	45,317	15
10 - 15	1,949	61,887	162	1,920	60,489	156	1,885	60,348	159
15 - 20	2,575	67,564	125	2,522	66,646	128	2,461	65,643	129
20 - 25	3,396	79,932	135	3,272	77,239	132	3,165	75,222	127
25 - 30	4,332	88,166	150	4,232	85,832	139	4,146	84,073	132
30 - 35	5,582	95,196	130	5,241	91,005	91	5,230	90,231	71
35 - 40	6,336	104,508	32	6,540	106,252	26	6,523	106,688	24
40 - 45	5,601	100,475	5	5,564	100,475	5	5,526	100,475	5
45 - 50	4,584	67,556	1	4,546	67,556	1	4,509	67,556	1

Years of Credited Service	2018			2017			2016		
	Average Monthly Benefit (\$)	Final Average Salary (\$)	Number of Retired Members	Average Monthly Benefit (\$)	Final Average Salary (\$)	Number of Retired Members	Average Monthly Benefit (\$)	Final Average Salary (\$)	Number of Retired Members
0 - 5	1,825	40,642	9	1,777	40,642	9	1,910	42,929	8
5 - 10	2,109	46,732	15	2,070	45,140	13	2,042	45,140	13
10 - 15	1,818	59,987	158	1,805	59,673	156	1,792	59,542	152
15 - 20	2,395	64,148	126	2,340	63,383	125	2,363	63,389	119
20 - 25	3,088	74,843	122	3,009	73,207	115	2,960	72,292	109
25 - 30	4,081	82,855	119	3,939	81,378	105	3,906	80,907	90
30 - 35	5,031	88,636	50	4,980	85,309	39	4,706	82,395	27
35 - 40	6,744	110,265	21	6,123	101,886	15	5,816	97,648	13
40 - 45	5,544	105,415	4	5,393	88,480	4	5,368	88,480	4
45 - 50	4,474	67,556	1	4,441	67,556	1	4,441	67,556	1

(d) Source: Segal Consulting

(e) This table provides for the most comprehensive average benefit payment data available. Data is being accumulated annually to present the required ten years of information.