



# Massachusetts Water Resources Authority Employees' Retirement System



Comprehensive Annual Financial Report  
For the Year Ended December 31, 2019



# Massachusetts Water Resources Authority Employees' Retirement System



## Comprehensive Annual Financial Report For the Year Ended December 31, 2019

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

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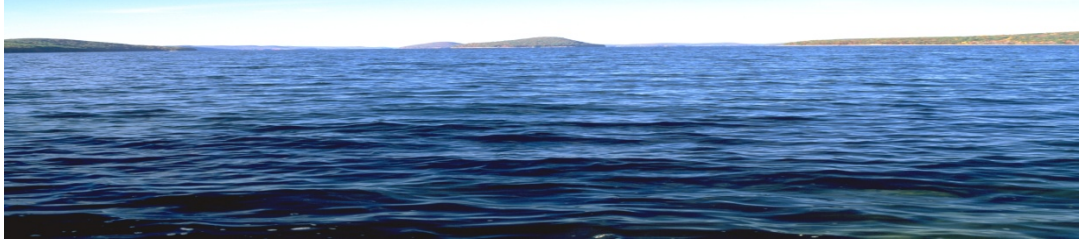
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## Introductory Section



## MWRA EMPLOYEES' RETIREMENT SYSTEM

June 29, 2020

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

On behalf of the MWRA Employees' Retirement System Board (MWRAERSB), I am pleased to present the Comprehensive Annual Financial Report (CAFR) of the MWRA Employees' Retirement System (MWRAERS) for the year ended December 31, 2019. 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' 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 2018, 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 2019.

By statute the 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. It is the fiduciary responsibility of the Board to insure that current and future retirement benefits will be paid. Therefore, safeguarding the MWRAERS' investment portfolio is a top priority. The MWRAERSB 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 having one of the highest funded ratios among public pension Systems in the Commonwealth. Our higher than average funded ratio allows the MWRAERS' 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.

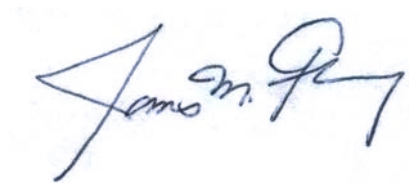
Investment returns were robust in 2019, driven primarily by equities, with domestic equity returning 30.5%, and international equity returning 22.4%, contributing to the overall portfolio's finishing the 2019 year at 15.6%.

The recently completed January 1, 2020 Actuarial Study of the MWRA Employees' Retirement System showed an unfunded actuarial liability of \$87.4 million, which was based on the actuarial value of assets. The increase in the unfunded liability when compared to the 1/1/19 valuation is due in large part to the Board's reduction in the investment return assumption from 7.25% to 7.10% made by the Board effective 1/1/20 to approximate more accurately long-term return expectations, and was adopted methodically, in conjunction with modifications to the Board's Investment Objectives and asset allocation, as a means to minimize risk. On April 30, 2020, the MWRA Retirement Board, based on the January 1, 2020 Valuation results, adopted a funding schedule which incorporates an increase to the retirees' cost of living base from \$14,000 to \$15,000 for fiscal year 2021, covers the Employer Normal Cost, and funds the amortization of the Unfunded Actuarial Accrued Liability by FY 2030. 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. 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 actions.

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 written in a cursive style with a large initial "J" and "F".

James M. Fleming, Esq.  
Chairman



## MWRA EMPLOYEES' RETIREMENT SYSTEM

June 29, 2020

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

Dear Mr. Chairman and Members of the Board:

I am pleased to submit the Comprehensive Annual Financial Report (CAFR) of the MWRA Employees' Retirement System (MWRAERS) for the year ended December 31, 2019. 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, 2018. This award is granted when an organization has submitted a CAFR 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. By regulation this policy must be reviewed on an annual basis at a minimum, but may be reassessed more frequently as circumstances may dictate. 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 15.58% for 2019 exceeded the actuarial expected rate of return and the Investment policy benchmark. Please refer to the Investment Section of this CAFR 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 to become effective in FY20, and will increase from \$14,000 to \$15,000 in FY21. The MWRAERS has granted the maximum 3% cost-of-living allowed by law since enactment of the legislation in 1997.

The MWRAERB 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 and contains anti-spiking provisions for both new members and current employees.

## **Administration**

In April 2020 Kevin McKenna was re-elected to the second elected Board Member's position and will serve a three year term ending in 2023. Mr. Andrew Pappastergion, the Secretary for the Board of Directors of the MWRA was appointed as the Ex-Officio Member of the Board effective January 17, 2017.

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.mwraretirement.com](http://www.mwraretirement.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 CAFR, Audits, summary Annual Reports published by PERAC, investment performance, etc.

## **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. A thorough review and update of these internal control procedures was performed in 2019, in order to further strengthen the established safeguards on behalf of our membership. 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. 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. 68 Accounting and Financial Reporting for Pensions.

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, 2019 are free of material misstatements. The report of the independent auditors is included in the Financial Section of this report. CLA has issued an unqualified opinion on the MWRAERS's basic financial statements for the year ended December 31, 2019.


### **Actuarial Funding**

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, 2020. 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, 2020, the funded ratio of the MWRAERS was calculated at 86.6% using the actuarial value of assets. On a fair value basis the funded ratio was 88.6%. Notably, this funded ratio was achieved in the 1/1/20 valuation in spite of the MWRAERS reducing the assumed rate of return on investments from 7.25% to 7.10%, a strategic move made by the Board to ensure that long term expectations are realistic, which in turn reduces 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

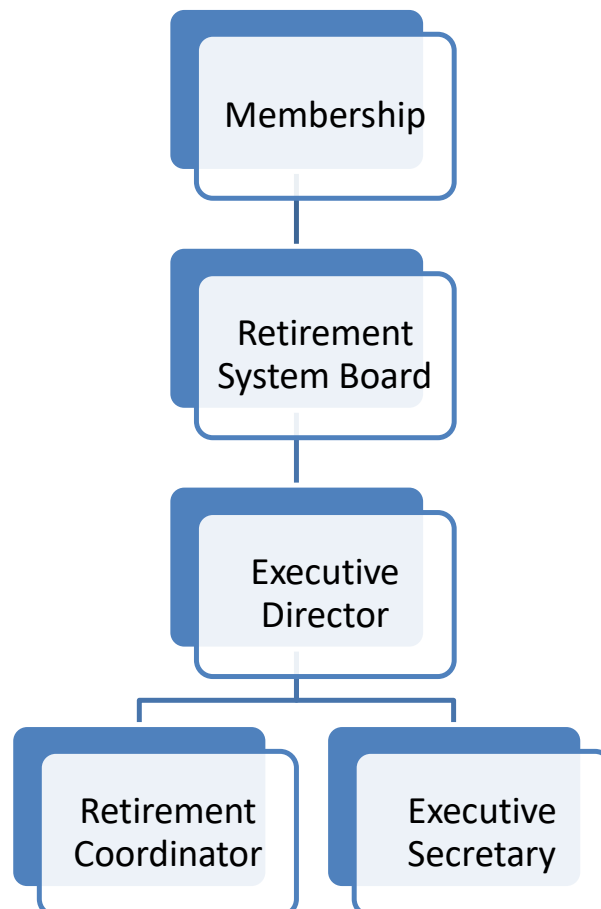
		Term Expiration
Andrew Pappastergion	Ex-Officio Member	no expiration
Thomas J. Durkin	Appointed Member	6/30/2021
James M. Fleming	Elected Member	6/30/2021
Kevin McKenna	Elected Member	4/29/2023
Frank Zecha	Member Appointed by Other Members	1/24/2022

## Retirement Board Staff

Carolyn M. Russo	Executive Director
Julie McManus	Retirement Coordinator
Janet DiGregorio	Executive Secretary

## 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 and return information may be found on the investment section of pages 39-53. Fee information can be found on the schedule of fees and commissions on pages 49-50 as well as the schedule of commissions to brokers on pages 51-52.



**Fund Managers**

**Alcentra**  
Private Equity - Alcentra European DLF

**Ascent Venture Partners, Boston, Massachusetts**  
Private Equity - Ascent Fund II  
Private Equity - Ascent Fund IV  
Private Equity - Ascent Fund IV-B  
Private Equity - Ascent Fund V  
Private Equity - Ascent Fund VI

**Boston Company/BNY Mellon, Boston, Massachusetts**  
International Equity

**CarVal New York, NY**  
Private Equity-CVI Credit Value Fin A IV

**Castile Ventures, Wellesley, Massachusetts**  
Private Equity - Castile Ventures III, L.P

**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-Ironrides 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

**Hartford Schroders Investment Management, New York, New York**  
International Equity - Alpha Fund

**Invesco, New York, New York**  
Fixed Income - Mortgage Recovery AIV  
Fixed Income - Mortgage Recovery II  
Private Equity - Invesco Fund IV  
Private Equity - Invesco Fund VI

**J.F. Lehman, New York, New York**  
Private Equity - JFL Equity Investors IV

**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

**Lee Munder Capital Group, Boston, Massachusetts**  
International Equity - LMCG Emerging Markets (SEI)  
International Equity - LMCG Small Cap International

**Loomis Sayles, Boston, Massachusetts**  
Small Cap - Small Cap Growth  
Fixed Income - Multi Sector Bonds

**Lord Abbett, Jersey City, New Jersey**  
Fixed Income - Lord Abbett Core Fixed Income

**Stepstone (Courtland Partners), Cleveland, Ohio**  
Real Estate - Real Estate Global Fund II

**Morgan Stanley, New York, New York**  
Real Estate - Prime Property

**Park Square New York, New York**  
Private Equity - Credit Opportunities Fund III

**PIMCO Investment LLC, New York, New York**  
Total Balanced - PIMCO Core Fund

**Pinebridge Investments, New York, New York**  
Private Equity - PEP Fund V

**Fund Managers (Continued)**

**Public Retirement Investment Trust (PRIT), Boston, Massachusetts**  
PRIT General Allocation Account  
PRIT Core Real Estate  
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

**Polen Capital, Boca Raton, Florida**  
Equities - Large Cap Growth

**Private Advisors Richmond, VA**  
Private Equity -Small Co. Coinvestment Fund

**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

**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-A7Q 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 Tobacco, 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

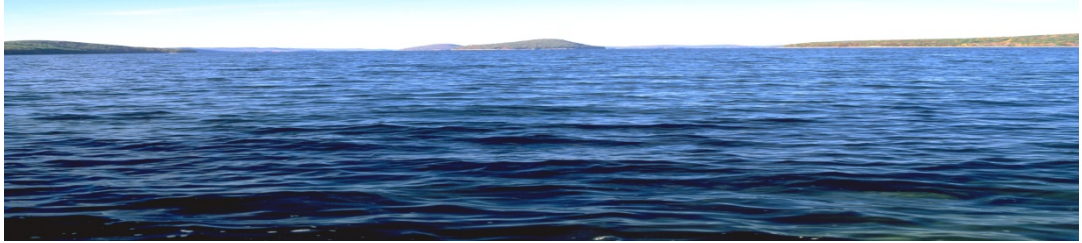
**Massachusetts Water Resources  
Authority Employees' Retirement System**

For its Comprehensive Annual  
Financial Report  
for the Fiscal Year Ended

**December 31, 2018**

*Christopher P. Morill*

Executive Director/CEO



## Financial Section



## INDEPENDENT AUDITORS' REPORT

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

### **Report on the Financial Statements**

We have audited the accompanying financial statements of the Massachusetts Water Resources Authority Employees' Retirement System (the System), as of and for the year ended December 31, 2019, and the related notes to the financial statements, as listed in the table of contents.

### ***Management's Responsibility for the Financial Statements***

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes 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.

### ***Auditors' Responsibility***

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements 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 entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.



**Opinion**

In our opinion, the financial statements referred to above present fairly, in all material respects, the net position of the System as of December 31, 2019, and the change in net position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

**Other Matters**

*Required Supplementary Information*

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis (located on pages 15 through 18), schedule of changes in employer net pension liability and related ratios, schedule of employer contributions and schedule of investment returns (located on pages 33 and 34) be presented to supplement the basic financial statements. Such information, 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 auditing standards generally accepted in the United States of America, 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.

*Other Information*

Our audit was conducted for the purpose of forming an opinion on the System's financial statements. The supplementary information, introductory section, investment section, actuarial section and statistical section are presented for purposes of additional analysis and are not a required part of the financial statements.

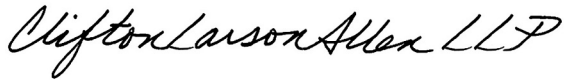
The supplementary information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial 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 auditing standards generally accepted in the United States of America. In our opinion, the supplementary information is fairly stated, in all material respects, in relation to the basic financial statements as a whole.

The introductory section, investment section, actuarial section, and statistical section have not been subjected to the auditing procedures applied in the audit of the financial statements, and accordingly, we do not express an opinion or provide any assurance on them.

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

**Other Reporting Required by *Government Auditing Standards***

In accordance with *Government Auditing Standards*, we have also issued our report dated June 29, 2020 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  
June 29, 2020

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
MANAGEMENT'S DISCUSSION AND ANALYSIS  
DECEMBER 31, 2019

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, 2019.

### **Financial Highlights**

The System's funding objective is to meet long-term benefit obligations through contributions and investment income. As of January 1, 2020, the latest actuarial valuation, the funded ratio was 86.62% based on the actuarial value of assets at that date. As of December 31, 2019, the plan fiduciary net position was 88.58% of the total pension liability.

The System's net position increased by \$71,665,485, or 14.1%, 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.

Total investment income (net) was \$79,556,988. The money-weighted investment return of 15.58% 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, 2019. 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, 2019. 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, 2019

**Financial Analysis**

The System's total assets as of December 31, 2019 were \$580,281,839 and were comprised of cash and cash equivalents, investments, and receivables. Total assets increased \$71,656,684, or 14.1%, from the prior year.

Total liabilities as of December 31, 2019 were \$1,324,887 and represent accounts payable, accrued expenses, amounts due to the MWRA and a payable for securities purchased. Total liabilities decreased \$8,801 or 0.7%, 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 \$578,956,952 at the close of the year and is summarized as follows:

**Statement of Fiduciary Net Position**

	2019	2018
<b>Assets</b>		
Cash and cash equivalents.....	\$ 6,589,580	\$ 8,204,021
Investments.....	573,258,327	500,114,888
Receivables.....	433,932	306,246
Total assets.....	580,281,839	508,625,155
<b>Liabilities</b>		
Accounts payable and accrued expenses.....	129,691	101,689
Due to MWRA.....	66,532	76,420
Payable for securities purchased.....	1,128,664	1,155,579
Total liabilities.....	1,324,887	1,333,688
<b>Fiduciary Net Position</b>		
Restricted for pensions.....	\$ 578,956,952	\$ 507,291,467

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
MANAGEMENT'S DISCUSSION AND ANALYSIS  
DECEMBER 31, 2019

Changes in Fiduciary Net Position

The System's net position increased by \$71,665,485 during the year and is summarized as follows:

**Statement of Changes in Fiduciary Net Position**

	2019	2018
<b>Additions</b>		
<i>Contributions:</i>		
Employer.....	\$ 7,315,000	\$ 7,000,000
Plan members.....	9,721,334	9,483,873
Total contributions.....	17,036,334	16,483,873
<i>Net investment income:</i>		
Net realized and unrealized gains (losses).....	73,816,105	(22,515,861)
Interest and dividends.....	7,873,869	9,145,125
Less investment fees.....	(2,132,986)	(3,742,726)
Net investment income (loss).....	79,556,988	(17,113,462)
Reimbursements and transfers from other systems.....	1,955,313	1,715,689
Total additions.....	98,548,635	1,086,100
<b>Deductions</b>		
Benefit payments to plan members and beneficiaries.....	25,661,840	22,652,903
Reimbursements and transfers to other systems.....	756,977	491,200
Administrative expenses.....	464,333	469,315
Total deductions.....	26,883,150	23,613,418
Change in fiduciary net position.....	71,665,485	(22,527,318)
Fiduciary net position - beginning of year.....	507,291,467	529,818,785
Fiduciary net position - end of year.....	\$ 578,956,952	\$ 507,291,467

**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 \$98,548,635 during the current year versus an increase of \$1,086,100 in the previous year. The 2019 and 2018 employer contributions represent 100.0% of the respective annual required contributions. The System had a net investment gain of \$79,556,988 in 2019 versus a loss of \$17,113,462 in 2018 due to favorable market conditions.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
MANAGEMENT'S DISCUSSION AND ANALYSIS  
DECEMBER 31, 2019

**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 \$26,883,150 during the current year versus \$23,613,418 in the previous year. The payment of pension benefits increased by \$3,008,937 or, 13.28%, over the previous year. The increase in these expenses resulted from an increase in benefit payments to newer retirees with higher average compensation and an increase of 47 retirees.

**Overall Financial Position**

The System experienced a large increase in net position for the year ending December 31, 2019, 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, 2019

<b>Assets</b>	
Cash and cash equivalents.....	\$ <u>6,589,580</u>
Investments:	
Fixed income.....	170,972,799
Equities.....	271,596,814
Real estate.....	46,182,274
Private equity.....	41,013,245
Hedge funds.....	19,575,415
PRIT (external investment pool).....	<u>23,917,780</u>
Total investments.....	<u>573,258,327</u>
Receivables:	
Accrued interest and dividends.....	293,917
For investments sold.....	<u>140,015</u>
Total receivables.....	<u>433,932</u>
Total plan assets.....	<u>580,281,839</u>
<b>Liabilities</b>	
Accounts payable and accrued expenses.....	129,691
Due to MWRA.....	66,532
Payable for securities purchased.....	<u>1,128,664</u>
Total plan liabilities.....	<u>1,324,887</u>
<b>Net position restricted for pensions .....</b>	<b>\$ <u><u>578,956,952</u></u></b>

The accompanying notes are an integral part of the financial statements.



MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
STATEMENT OF CHANGES IN FIDUCIARY NET POSITION  
FOR THE YEAR ENDED DECEMBER 31, 2019

<b>Additions:</b>	
Contributions:	
Employer.....	\$ 7,315,000
Plan members.....	<u>9,721,334</u>
Total contributions.....	<u>17,036,334</u>
Investment income:	
Interest and dividends.....	7,873,869
Net realized and unrealized gains (losses).....	73,816,105
Less: investment fees.....	<u>(2,132,986)</u>
Net investment (loss).....	<u>79,556,988</u>
Reimbursements and transfers from other systems.....	<u>1,955,313</u>
Total additions.....	<u>98,548,635</u>
<b>Deductions:</b>	
Benefits and refunds paid to plan members and beneficiaries.....	25,661,840
Reimbursements and transfers to other systems.....	756,977
Administrative expenses.....	<u>464,333</u>
Total deductions.....	<u>26,883,150</u>
Change in fiduciary net position.....	71,665,485
Net position restricted for pensions:	
Beginning of year.....	<u>507,291,467</u>
<b>End of year.....</b>	<u><u>\$ 578,956,952</u></u>

The accompanying notes are an integral part of the financial statements.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
NOTES TO THE FINANCIAL STATEMENTS  
DECEMBER 31, 2019

**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.

**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/>.

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.

**E. Revenue Recognition**

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.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 NOTES TO THE FINANCIAL STATEMENTS  
 DECEMBER 31, 2019

**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, 2019, \$66,532 is 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 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.

Membership in the System was as follows at December 31, 2019:

Active members.....	1,105
Inactive members.....	112
Retirees and beneficiaries currently receiving benefits.....	<u>672</u>
Total.....	<u><u>1,889</u></u>

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
NOTES TO THE FINANCIAL STATEMENTS  
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**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  
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**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, 2019:

<u>Asset Class</u>	<u>Target</u>	<u>Range</u>
Domestic Equities	24%	10-30%
International Equities	20%	10-25%
Domestic Bonds	25%	15-40%
Real Estate	10%	0-10%
Private Equity	10%	0-12%
Hedge Funds/Absolute Return	6%	0-12%
Global Asset Allocation	5%	5-25%
Cash	0%	0-10%

Rate of Return

For the year ended December 31, 2019, the annual money-weighted rate of return on investments, net of investment expense, was 15.58%. 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, 2019, the System was not exposed to custodial credit risk. The carrying value of the System's deposits totaled \$10,000 at December 31, 2019.

Investments Summary

The System's investments at December 31, 2019 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.....	\$ 6,579,580	\$ 6,579,580	\$ -	\$ -	\$ -
Fixed income securities.....	170,972,799	98,362,198	36,708,662	22,840,454	13,061,485
Total debt securities.....	177,552,379	\$ 104,941,778	\$ 36,708,662	\$ 22,840,454	\$ 13,061,485
<u>Other Investments:</u>					
Equity securities.....	271,596,814				
External investment pools (PRIT).....	23,917,780				
Hedge funds.....	19,575,415				
Real estate.....	46,182,274				
Private equity.....	41,013,245				
Total other investments.....	402,285,528				
Total investments (including cash equivalents).....	\$ 579,837,907				

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, 2019, 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, 2019, 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, 2019, the credit quality ratings of the System's fixed income securities, excluding U.S. Treasury securities of \$46,889,580, are as follows:

Quality Ratings *	Fixed Income Securities
AA+.....	\$ 1,729,149
AA-.....	1,767,462
A+.....	1,667,072
A.....	4,134,691
A-.....	10,719,847
BBB+.....	6,155,464
Unrated.....	97,909,534
Total.....	\$ 124,083,219

\*Per Standard and Poors, 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, 2019, the System had indirect exposure to foreign currency risk for certain equity investments issued by foreign countries in the amount of \$124,016,484.

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, 2019, 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, 2019:

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.....	\$ 6,579,580	\$ 6,579,580	\$ -
Fixed income.....	<u>170,972,799</u>	<u>144,799,114</u>	<u>26,173,685</u>
Total Debt Securities.....	<u>177,552,379</u>	<u>151,378,694</u>	<u>26,173,685</u>
<u>Equity Securities:</u>			
Equity securities.....	<u>271,596,814</u>	<u>210,089,365</u>	<u>61,507,449</u>
Total Investments by Fair Value Level .....	<u>449,149,193</u>	<u>\$ 361,468,059</u>	<u>\$ 61,507,449</u>
<u>Investments measured at the net asset value (NAV)</u>			
Private equity.....	41,013,245		
Real estate .....	46,182,274		
Hedge funds.....	<u>19,575,415</u>		
Investments measured at the net asset value (NAV).....	<u>106,770,934</u>		
<u>Other investments measured at fair value</u>			
External investment pool (PRIT) .....	<u>23,917,780</u>		
Total Investments measured at Fair Value .....	<u>\$ 579,837,907</u>		

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 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  
NOTES TO THE FINANCIAL STATEMENTS  
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Investments Measured at the NAV

	Fair Value	Unfunded Commitments	Redemption Frequency	Notice Period
Private equity (1).....	\$ 41,013,245	15,826,968	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>
Real estate (2).....	46,182,274	5,151,757	N/A <sup>(2)</sup>	N/A <sup>(2)</sup>
Hedge funds (3).....	<u>19,575,415</u>	-	Quarterly	90-100 days
Total Investments Measured at the NAV.....	<u>\$ 106,770,934</u>			

- (1) Private Equity Funds: This type includes 21 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 \$19,900,000 and \$15,300,000 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 15 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 \$800,000, \$9,400,000, and \$9,500,000. The investments can be redeemed quarterly, with a redemption notice period of 90 days, 90 days, and 100 days respectively.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
NOTES TO THE FINANCIAL STATEMENTS  
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**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, 2019, employer contributions totaled \$7,315,000 and plan member contributions totaled \$9,721,334.

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 (ASSET) OF THE SYSTEM**

The components of the net pension liability of the System at December 31, 2019, were as follows:

Total pension liability.....	\$	653,616,012
Plan fiduciary net position.....		<u>(578,956,952)</u>
Net pension liability.....	\$	<u><u>74,659,060</u></u>
Plan fiduciary net position as a percentage of the total pension liability.....		88.58%

Actuarial Methods and Assumptions

The total pension liability was determined by an actuarial valuation as of January 1, 2020, which was rolled back to the measurement date of December 31, 2019, using the following actuarial methods and assumptions, which apply to all periods included in the measurement:

<u>Methods:</u>	
Actuarial cost method	Entry Age Normal Cost Method
Asset valuation method	Fair Value
<u>Assumptions:</u>	
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 (7.25% in the previous year)
Cost of living adjustment	3% of the first \$14,000, increasing to 3% of the first \$15,000 as of July 1, 2020 and to 3% of the first \$15,000 as of July 1, 2021

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
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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 Table set forward 1 year projected generationally with Scale MP-2017

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, 2019 are summarized in the following table:

Asset Class	Long-Term Expected Real Rate of Return (%)
Domestic equity.....	6.15
International developed markets equity.....	6.78
International emerging markets equity.....	8.65
Core fixed income.....	1.11
High-yield fixed income.....	3.51
Real estate.....	4.33
Hedge fund, global tactical asset allocation, risk parity.....	3.19
Private equity.....	9.99

Discount Rate

The discount rate used to measure the total pension liability was 7.10 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 7.10 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 (6.10 percent) or 1-percentage-point higher (8.10 percent) than the current rate:

	1% Decrease (6.10%)	Current Discount Rate (7.10%)	1% Increase (8.10%)
Net pension liability.....	\$ 153,965,986	\$ 74,659,060	\$ 7,444,286

**NOTE 6 – LEGALLY REQUIRED RESERVE ACCOUNTS**

The balances in the System's legally required reserves as of December 31, 2019 are as follows:

Description	Amount	Purpose
Annuity Savings Fund....	\$ 122,656,836	Active members' contribution balance
Annuity Reserve Fund...	41,241,026	Retired members' contribution account
Military Service Fund.....	149,187	Members' contribution account while on military leave
Pension Reserve Fund...	408,358,706	Amounts appropriated to fund future retirement
Pension Fund.....	6,551,197	Remaining net position
Total.....	\$ 578,956,952	

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

**NOTE 7 – SUBSEQUENT EVENTS**

Subsequent to year end, the World Health Organization declared the spread of Coronavirus Disease (COVID-19) a worldwide pandemic. The COVID-19 pandemic is having significant effects on global markets, supply chains, businesses, and communities. Specific to MWRAERS, both domestic and international equity markets have experienced significant volatility during the period from January 1, 2020 through June 29, 2020. This activity is not reflected in the Financial Statements as of December 31, 2019 as these events occurred subsequent to year end and are still developing. Management believes the MWRAERS is taking appropriate actions to mitigate the impact. However, the full impact of COVID-19 is unknown and cannot be reasonably estimated as these events occurred subsequent to year end and are still developing.

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 REQUIRED SUPPLEMENTARY INFORMATION  
 DECEMBER 31, 2019

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

	2019	2018	2017	2016	2015	2014
<u>Total pension liability</u>						
Service cost.....	\$ 12,734,657	\$ 11,761,819	\$ 11,307,822	\$ 11,079,991	\$ 10,637,880	\$ 10,529,508
Interest.....	44,061,874	41,391,851	38,520,217	36,917,053	34,598,348	33,587,256
Differences between expected and actual experience.....	3,528,888	3,250,413	(145,554)	(9,143,704)	-	(8,379,618)
Changes of assumptions.....	10,507,016	16,401,129	7,977,350	13,298,185	-	4,920,735
Changes of benefit terms.....	-	5,026,543	-	2,050,275	-	-
Benefit payments, including refunds of member contributions and net reimbursements and transfers to/from other systems.....	(24,463,504)	(21,428,414)	(18,222,342)	(16,129,253)	(15,389,885)	(12,963,429)
Net change in total pension liability.....	46,368,931	56,403,341	39,437,493	38,072,547	29,846,343	27,694,452
Total pension liability - beginning.....	607,247,081	550,843,740	511,406,247	473,333,700	443,487,357	415,792,905
Total pension liability - ending (a).....	\$ 653,616,012	\$ 607,247,081	\$ 550,843,740	\$ 511,406,247	\$ 473,333,700	\$ 443,487,357
<u>Plan fiduciary net position</u>						
Contributions - employer.....	\$ 7,315,000	\$ 7,000,000	\$ 3,277,369	\$ 4,632,624	\$ 8,159,521	\$ 12,629,474
Contributions - employer - military service credit.....	-	-	-	-	-	16,000
Contributions - member.....	9,721,334	9,483,873	9,091,378	8,757,540	8,402,138	8,245,328
Net investment income.....	79,556,988	(17,113,462)	70,516,672	24,182,878	(530,090)	20,483,877
Benefit payments, including refunds of member contributions and net reimbursements and transfers to/from other systems.....	(24,463,504)	(21,428,414)	(18,222,342)	(16,129,253)	(15,389,885)	(12,963,429)
Administrative expense.....	(464,333)	(469,315)	(446,465)	(426,053)	(412,416)	(407,574)
Net change in plan fiduciary net position.....	71,665,485	(22,527,318)	64,216,612	21,017,736	229,268	28,003,676
Plan fiduciary net position - beginning.....	507,291,467	529,818,785	465,602,173	444,584,437	444,355,169	416,351,493
Plan fiduciary net position - ending (b).....	\$ 578,956,952	\$ 507,291,467	\$ 529,818,785	\$ 465,602,173	\$ 444,584,437	\$ 444,355,169
Net pension liability (asset) - ending (a) - (b).....	\$ 74,659,060	\$ 99,955,614	\$ 21,024,955	\$ 45,804,074	\$ 28,749,263	\$ (867,812)
Plan fiduciary net position as a percentage of the total pension liability.....	88.58%	83.54%	96.18%	91.04%	93.93%	100.20%
Covered payroll.....	\$ 98,145,213	\$ 95,818,684	\$ 92,975,107	\$ 89,755,173	\$ 89,168,911	\$ 88,646,339
Net pension liability as a percentage of covered payroll.....	76.07%	104.32%	22.61%	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, 2019

**Schedule of Employer Contributions**

	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>
Actuarially determined contribution.....	\$ 7,315,000	7,000,000	3,277,369	3,132,624	8,159,521
Contributions in relation to the actuarially determined contribution.....	<u>7,315,000</u>	<u>7,000,000</u>	<u>3,277,369</u>	<u>4,632,624</u>	<u>8,159,521</u>
Contribution deficiency (excess).....	\$ <u>-</u>	<u>-</u>	<u>-</u>	<u>(1,500,000)</u>	<u>-</u>
Covered payroll.....	\$ 98,145,213	95,818,684	92,975,107	89,755,173	89,168,911
Contributions as a percentage of covered payroll.....	7.45%	7.31%	3.52%	5.16%	9.15%

	<u>2014</u>	<u>2013</u>	<u>2012</u>	<u>2011</u>	<u>2010</u>
Actuarially determined contribution.....	\$ 7,808,155	5,918,931	5,765,956	5,511,524	5,342,856
Contributions in relation to the actuarially determined contribution.....	<u>12,629,474</u>	<u>12,447,338</u>	<u>10,490,247</u>	<u>7,363,170</u>	<u>5,342,856</u>
Contribution deficiency (excess).....	\$ <u>(4,821,319)</u>	<u>(6,528,407)</u>	<u>(4,724,291)</u>	<u>(1,851,646)</u>	<u>-</u>
Covered payroll.....	\$ 88,646,339	84,829,033	84,829,033	82,870,385	82,870,385
Contributions as a percentage of covered payroll.....	14.25%	14.67%	12.37%	8.89%	6.45%

(concluded)

**Schedule of Investment Returns (1)**

	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>
Annual money-weighted rate of return, net of investment expense.....	15.58%	-10.03%	15.02%	5.81%	-0.24%	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, 2019

**Changes of Assumptions**

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 cost of living adjustment was increased to 3% of the first \$14,000.

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

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	7.25%, 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 Table set forward 1 year projected generationally with Scale MP-2017

MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
SUPPLEMENTARY INFORMATION  
DECEMBER 31, 2019

**Schedule of Administrative Expenses**

The composition of administrative expenses for the year ended December 31, 2019 is as follows:

Personal services	
Salaries	<u>\$ 299,038</u>
Professional services	
Legal expenses	25,297
Medical expenses	168
Actuarial Services	24,500
Accounting Services	<u>24,000</u>
Total Professional Services	<u>73,965</u>
Other Expenses	
Fiduciary insurance	12,611
Service contracts	34,050
Education and training	4,490
Administrative expenses	31,198
Travel	<u>8,981</u>
Total other expenses	<u>91,330</u>
Total Expenses	<u>\$ 464,333</u>



MASSACHUSETTS WATER RESOURCES AUTHORITY EMPLOYEES' RETIREMENT SYSTEM  
 SUPPLEMENTARY INFORMATION  
 DECEMBER 31, 2019

**Schedule of Investment and Consultants' Expenses**

Total Balanced		
PRIM General Allocation Account	\$	19,779
Wellington Opportunistic		92,114
Large Cap Domestic Equity		
Coho		126,319
Polen		145,649
Rhumblin S&P 500		19,771
Small Cap Domestic Equity		
Loomis Sayles		77,580
Robeco		169,941
International Equity		
SEG Baxter Street		318,272
Fixed Income		
Entrust		9,621
Garcia Hamilton		90,581
Invesco Mortgage Recovery AIV		827
Invesco Mortgage Recovery II		47,083
Loomis Sayles Fixed Income		175,695
PRIT Hedge		147,458
Rhumblin US TIPS		14,040
Real Estate		
Cerberus		23,593
Stepstone Real Estate Global Fund II		10,583
Morgan Stanley Prime Property		149,005
PRIT Real Estate		37,792
TA Realty Fund X		8,904
TA Core Realty		26,636
TerraCap III		(58,882)
TerraCap IV		(113,721)
Private Equity		
Alcentra		137,772
Ascent IV		1,660
Ascent IV-B		1,814
Ascent V		7,500
Ascent VI		37,500
CarVal		117,253
Constitution		75,153
Foundry 2007		(26,767)
Foundry 2010		37,394
Invesco IV		7,996
Invesco VI		50,509
J.F. Lehman		87,625
Kayne Anderson		(375,337)
Park Square		64,491
Pinebridge		432
PRIT VY 2008		5,981
PRIT VY 2009		2,651
PRIT VY 2010		8,765
PRIT VY 2011		13,556
PRIT VY 2012		9,179
PRIT VY 2014		20,043
PRIT VY 2017		33,362
Private Advisors		<u>71,319</u>
TOTAL INVESTMENT MANAGEMENT FEES		1,928,491
CUSTODIAL FEES		
People's United Bank		85,745
CONSULTANT FEES		
NEPC		<u>118,750</u>
TOTAL ALL INVESTMENT-RELATED FEES	\$	<u>2,132,986</u>



## Investment Section

## REPORT ON INVESTMENT ACTIVITY

The information contained in the Investment Section of the Comprehensive Annual Financial Report (CAFR) 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 System, the investment managers hired by the System, the System's custodian, and NEPC. The investment returns presented herein were calculated in a manner consistent with that specified in the Global Investment Performance Standards (GIPS®), as developed by the CFA Institute.

### 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
Fixed Income / Equity	Global Asset Allocation	Total Return Potential Diversification/Reduced Volatility

## 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 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 12/31/19

	Target (%)	Range (%)
Domestic Stocks <sup>1</sup>	24%	10-30%
International Stocks <sup>2</sup>	20%	10-25%
Domestic Bonds <sup>3</sup>	25%	15-40%
Real Estate	10%	0-10%
Private Equity	10%	0-12%
Hedge Funds/Absolute Return	6%	0-12%
Global Asset Allocation	5%	5-25%
Cash	0%	0-10%

<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

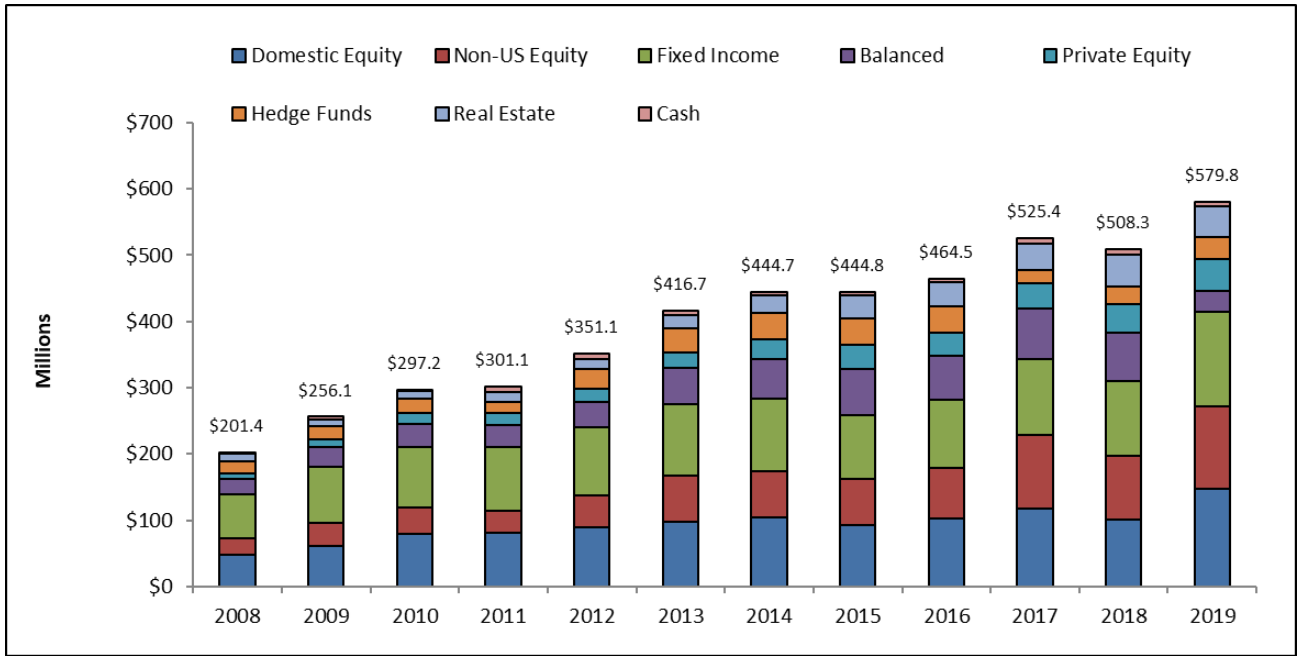
All monies invested for the Board by investment managers after the adoption of this investment policy statement shall conform to this statement. To the extent that the Board shall deliver to an investment manager, in cash or kind, or fund assets here to fore invested for them by other investment managers, 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 12/31/19

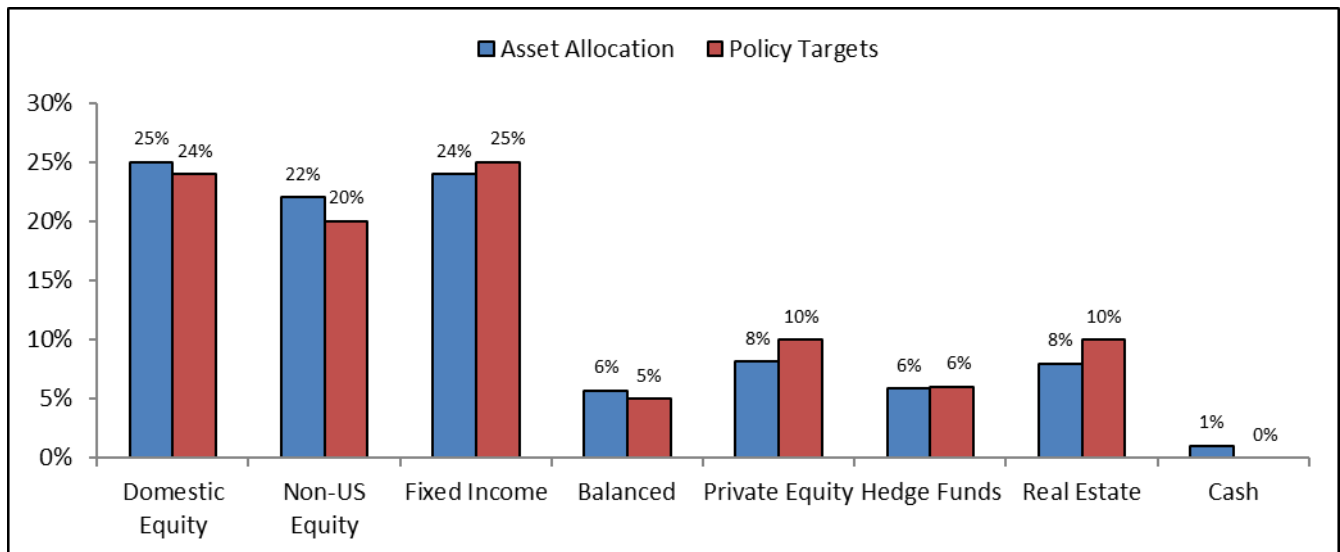
	4Q19	1 YR	3 YR	5 YR	10 YR	Since Inception	Inception Date
<b>Total Composite</b>	<b>4.9</b>	<b>15.6</b>	<b>8.9</b>	<b>6.4</b>	<b>7.9</b>	<b>6.9</b>	<b>1/1/1986</b>
Allocation Index	5	16.1	9.1	6.9	7.8	--	
Policy Index	5.2	17.4	9.2	7.2	8	--	
<b>Total Balanced</b>	<b>3.9</b>	<b>10.4</b>	<b>5.6</b>	<b>3.7</b>	<b>--</b>	<b>4.1</b>	<b>12/1/2010</b>
60% MSCI ACWI (Net) / 40% FTSE WGBI	5.2	18.2	9.2	6	--	6.3	
<b>Total Domestic Equity</b>	<b>9.4</b>	<b>30.5</b>	<b>15.6</b>	<b>10.8</b>	<b>13.3</b>	<b>7.3</b>	<b>5/1/1999</b>
Russell 3000	9.1	31	14.6	11.2	13.4	6.8	
<b>Total Non-US Equity</b>	<b>9.4</b>	<b>22.4</b>	<b>11</b>	<b>5.3</b>	<b>4.1</b>	<b>4.6</b>	<b>3/1/1999</b>
MSCI ACWI EAFE	8.2	22	9.6	5.7	5.5	4.5	
<b>Total Fixed Income</b>	<b>0.5</b>	<b>9</b>	<b>4.4</b>	<b>3.3</b>	<b>5.4</b>	<b>6.5</b>	<b>3/1/1999</b>
Barclays Aggregate	0.2	8.7	4	3	3.7	4.8	
<b>Total Hedge Fund</b>	<b>2.1</b>	<b>7.3</b>	<b>3.4</b>	<b>1.8</b>	<b>3.6</b>	<b>3.1</b>	<b>10/1/2006</b>
HFRI Fund of Funds Composite Index	3.1	8.4	3.9	2.4	2.8	2.3	
<b>Total Real Estate</b>	<b>2.1</b>	<b>8.3</b>	<b>8.2</b>	<b>9.4</b>	<b>11</b>	<b>8</b>	<b>4/1/1999</b>
NCREIF Property Index	1.6	6.4	6.7	8.2	10.2	8.8	
<b>Total Private Equity</b>	<b>0.1</b>	<b>4.2</b>	<b>10.5</b>	<b>11.4</b>	<b>13.4</b>	<b>9.2</b>	<b>4/1/1999</b>
C A US All PE	4	14.3	14.1	12.1	13.8	12.4	
<b>Cash</b>	<b>0.9</b>	<b>2.7</b>	<b>1.9</b>	<b>1.2</b>	<b>--</b>	<b>0.7</b>	<b>12/1/2010</b>
91 Day T-Bills	0.4	2.1	1.6	1.1	--	0.6	

<sup>4</sup> Net of fees

### HISTORICAL ASSET ALLOCATION - ASSET SIZE

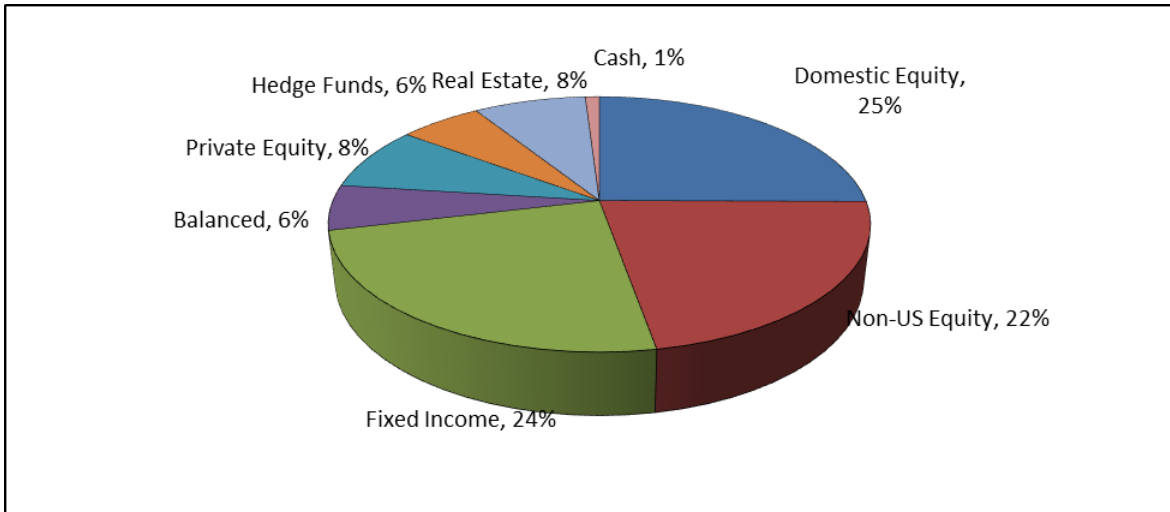


### AGGREGATE ASSET ALLOCATION VS. POLICY TARGETS<sup>5</sup>

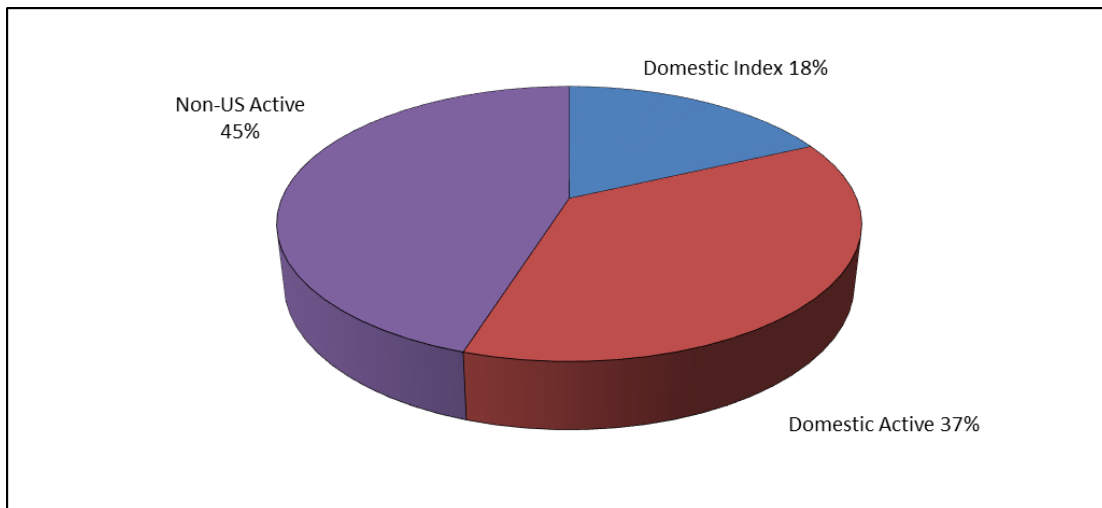


<sup>5</sup> Percentages may not sum to 100% due to rounding.

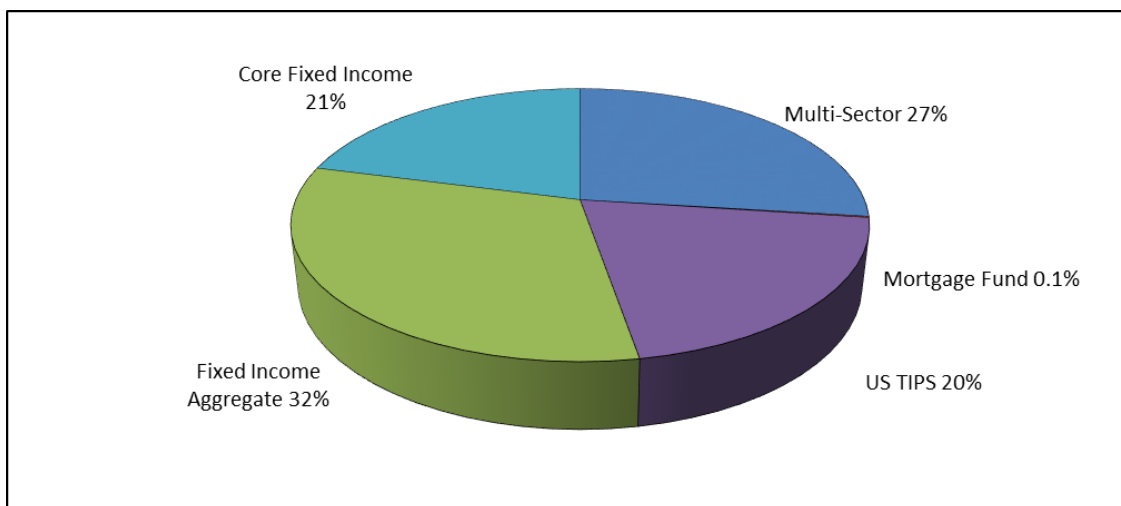
### AGGREGATE ASSET ALLOCATION<sup>6</sup>



### 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>
FACEBOOK CLASS A	61,043.76	\$6.2	6.16%	Communication Services
ALPHABET 'C'	53,769.14	\$5.8	5.77%	Communication Services
VISA 'A'	43,372.14	\$5.7	5.65%	Information Technology
ADOBE (NAS)	4,264.36	\$4.4	4.39%	Information Technology
MICROSOFT	33,380.22	\$4.4	4.38%	Information Technology
MASTERCARD	32,976.21	\$4.3	4.29%	Information Technology
UNITEDHEALTH GROUP	32,721.75	\$4.2	4.19%	Health Care
AMGEN	16,729.15	\$3.8	3.76%	Health Care
ZOETIS A	14,722.56	\$3.7	3.64%	Health Care
APPLE	6,522.60	\$2.2	2.23%	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	44.3	31.2%
2 Loomis Sayles Fixed Income	38.7	27.2%
3 Rhumblin TIPS	28.8	20.3%
4 Lord Abbett Core Fixed Income	22.9	16.1%
5 Octagon Senior Secured Credit Cayman	7.2	5.0%

**2019 SCHEDULE OF FEES & COMMISSIONS**

<b>2019 Investment Manager Fees</b>	
<b>Manager</b>	<b>Fee</b>
Alcentra (in liquidation)	\$137,771.88
Ascent II (in liquidation)	\$0.00
Ascent IV	\$1,660.00
Ascent IV-B	\$1,814.00
Ascent V	\$7,500.00
Ascent VI	\$37,500.00
Boston Company (acct closing, residual bal.)	\$0.00
CarVal	\$117,253.00
Castile (in liquidation)	\$0.00
Cerberus	\$23,593.00
Coho	\$126,319.37
Constitution Ironsides	\$75,153.43
Corbin Pinehurst	\$0.00
Entrust	\$9,621.02
Foundry 2007	(\$26,767.00)
Foundry 2010	\$37,394.00
Foundry 2010 Annex (incl. in 2010 above)	\$0.00
Garcia Hamilton	\$90,580.85
Hartford Schroders	\$0.00
Invesco IV (in liquidation)	\$7,996.00
Invesco Mortgage Recovery AIV	\$827.00
Invesco Mortgage Recovery II	\$47,083.00
Invesco VI	\$50,509.00
J.F. Lehman	\$87,625.00
Kayne Anderson	(\$375,335.00)
Landmark VI	\$0.00
Landmark VIII	\$0.00
Landmark XV	\$0.00
LMCG Emerging Markets	\$0.00
LMCG Small Cap International	\$0.00
Loomis Sayles Sall Cap	\$77,579.58
Loomis Sayles Fixed Income CIT	\$175,695.10
Lord Abbett	\$0.00
Morgan Stanley Prime Property	\$149,005.03
Octagon	\$0.00
Park Square	\$64,491.00
PIMCO	\$0.00
Pinebridge	\$432.00
Polen Capital	\$145,648.78
PRIT General Allocation	\$19,778.88
PRIT Hedge Funds	\$147,457.58
PRIT Real Estate	\$37,791.69
PRIT VY2008	\$5,980.92
PRIT VY2009	\$2,650.68
PRIT VY2010	\$8,765.04
PRIT VY2011	\$13,555.98
PRIT VY2012	\$9,179.25

PRIT VY2014	\$20,042.74
PRIT VY2017	\$33,361.56
Private Advisors	\$71,319.00
Real Estate Global Partnership II (Stepstone)	\$10,583.00
Rhumblin S&P 500	\$19,771.00
Rhumblin US TIPS	\$14,040.00
Robeco	\$169,941.42
SEG Baxter Street Fund	\$318,271.81
TA Realty Fund X	\$8,904.00
TA Core Realty	\$26,636.02
Terracap III	(\$58,882.07)
Terracap IV	(\$113,721.82)
UBS	\$0.00
Wellington (Term. 2019)	\$92,114.15
William Blair	\$0.00
<b>Total Investment Manager Fees</b>	<b>\$1,928,490.87</b>
NEPC (Consultant Fee)	\$118,750.00
People's United Bank (Custodial Bank Fee)	\$85,744.99
<b>Total All Investment-Related Fees</b>	<b>\$2,132,985.86</b>
Plus Administrator Expenses	\$464,333.14
<b>Total All Investment-Related Fees</b>	<b>\$2,597,319.00</b>

**2019 COMMISSIONS TO BROKERS**

<b>Broker Name</b>	<b>Total Commissions (\$)</b>	<b>Total Shares</b>	<b>%/Share</b>
BAIRD, ROBERT W & CO INC, MILWAUKEE	216.40	6,481.00	0.03
BARCLAYS CAPITAL INC./LE, NEW JERSEY	542.45	17,288.00	0.03
BARCLAYS CAPITAL LE, NEW YORK	167.78	7,697.00	0.02
BERNSTEIN SANFORD C & CO, NEW YORK	1,020.79	50,087.00	0.02
CANTOR CLEARING SERV, NEW YORK	7.98	399.00	0.02
CANTOR CLEARING SERVICE, NEW YORK	1.16	58.00	0.02
CANTOR FITZGERALD & CO INC, NEW YORK	14.40	360.00	0.04
CITIGROUP GLOBAL MARKETS, INC., NEW YORK	479.78	12,766.00	0.04
CLSA AMERICAS, NEW YORK	132.30	4,410.00	0.03
COWEN AND CO LLC, NEW YORK	257.88	11,411.00	0.02
COWEN AND COMPANY, LLC, JERSEY CITY	529.27	15,604.00	0.03
CREDIT SUISSE, NEW YORK (CSUS)	969.97	48,760.00	0.02
DIRECT TRADING, UNITED STATES	30.94	1,237.00	0.03
GOLDMAN SACHS & CO, NY	571.98	35,726.00	0.02
GUGGENHEIM CAPITAL MARKETS LLC, NEW YORK	-	6.00	-
INSTINET CLEARING SER INC, NEW YORK	52.53	2,645.00	0.02
INSTINET CORP, NEW YORK	13.70	1,370.00	0.01
INVESTMENT TECH GROUP INC, NEW YORK	10.94	556.00	0.02
ISI GROUP INC, NEW YORK	57.12	1,428.00	0.04
ITG INC, NEW YORK	28.20	1,658.00	0.02
J.P MORGAN SECURITIES INC, NEW YORK	1,059.23	36,569.00	0.03
J.P. MORGAN CLEARING CORP, NEW YORK	80.75	9,221.00	0.01
J.P. MORGAN SECURITIES LLC, NEW YORK	228.27	16,368.00	0.01
JEFFERIES & CO INC, NEW YORK	2,247.48	97,106.00	0.02
JONESTRADING INST SVCS LLC, NEW YORK	140.66	6,203.00	0.02
KEEFE BRUYETTE + WOODS INC, NEW YORK	48.40	1,232.00	0.04
KNIGHT EQUITY MARKETS LP, NEW YORK	308.39	12,640.00	0.02
LEERINK SWANN AND COMPANY, NEW YORK	17.00	425.00	0.04
LIQUIDNET INC, NEW YORK	278.27	12,654.00	0.02
LUMINEX TRADING AND ANALYTICS, BOSTON	160.40	9,311.00	0.02
MERRILL LYNCH PIERCE FENNER SMITH INC NY	971.05	41,416.00	0.02
MORGAN STANLEY & CO INC, NY	572.83	29,109.00	0.02
NATIONAL FINL SVCS CORP, NEW YORK	483.59	12,706.00	0.04
NEEDHAM AND CO LLC, NEW YORK	-	9.00	-
OPPENHEIMER & CO INC, NEW YORK	179.40	5,235.00	0.03
PERSHING LLC, JERSEY CITY	2.82	147.00	0.02
PIPER JAFFRAY & CO., JERSEY CITY	41.92	1,771.00	0.02
RAYMOND JAMES & ASSOC INC, ST PETERSBURG	266.04	6,710.00	0.04
RBC CAPITAL MARKETS LLC, NEW YORK	224.99	7,244.00	0.03
SEAPORT GROUP SECURITIES, LLC, NEW YORK	45.60	1,140.00	0.04
STATE STREET GLOBAL MARKETS LLC, BOSTON	1.96	98.00	0.02
STIFEL NICOLAUS	138.54	3,727.00	0.04
STOCK DISTRIBUTION	-	3,982.38	-
SUNTRUST CAPITAL MARKETS INC, NEW YORK	62.32	1,558.00	0.04

UBS SECURITIES LLC, STAMFORD	602.90	27,683.00	0.02
WEDBUSH MORGAN SECS INC, LOS ANGELES	26.52	1,326.00	0.02
WEEDEN & CO, NEW YORK	19.60	490.00	0.04
WELLS FARGO SECURITIES, LLC, NEW YORK	985.24	24,631.00	0.04
WILLIAM BLAIR & CO, CHICAGO	48.72	1,388.00	0.04
UNCLASSIFIED	-	36,634.84	-
<b>TOTAL</b>	<b>14,348.46</b>	<b>628,681.22</b>	<b>0.03</b>



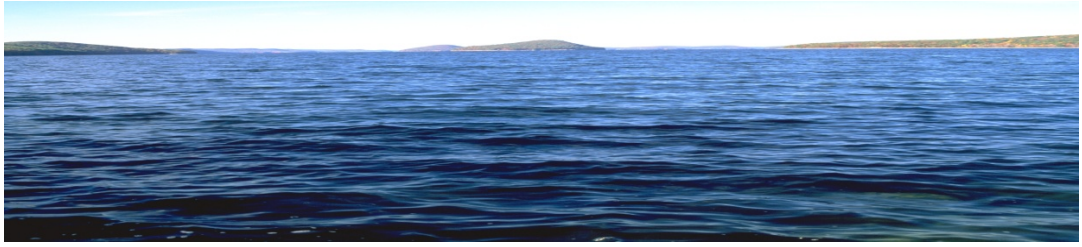
## 2019 INVESTMENT SUMMARY<sup>7</sup>

	Market Value Dollar Amount (\$mm)	% of Asset Class	% of System
<b>Total System</b>	<b>\$579.8</b>	<b>NA</b>	<b>100.0%</b>
<b>Total Domestic Equity Assets</b>	<b>\$147.5</b>	<b>100.0%</b>	<b>25.4%</b>
Info. Tech.	\$32.6	22.1%	5.6%
Health Care	\$22.9	15.5%	4.0%
Financials	\$21.4	14.5%	3.7%
Cons. Disc.	\$18.1	12.3%	3.1%
Industrials	\$16.5	11.2%	2.8%
Comm. Svc.	\$11.9	8.1%	2.1%
Cons. Staples	\$11.2	7.6%	1.9%
Energy	\$5.8	3.9%	1.0%
Materials	\$3.1	2.1%	0.5%
Real Estate	\$2.1	1.4%	0.4%
Utilities	\$1.9	1.3%	0.3%
<b>Total Foreign Equity Assets</b>	<b>\$124.1</b>	<b>100.0%</b>	<b>21.4%</b>
Europe-Developed	\$53.1	42.8%	9.2%
Pacific Rim/Australia Asia- Developed	\$41.3	33.3%	7.1%
Emerging Markets	\$15.2	12.3%	2.6%
Unclassified	\$8.6	6.9%	1.5%
North America	\$5.9	4.7%	1.0%
<b>Total Fixed Income Assets</b>	<b>\$142.0</b>	<b>100.0%</b>	<b>24.5%</b>
U.S. Treasury/Agency	\$69.1	48.7%	11.9%
Corporate	\$57.6	40.6%	9.9%
Asset Backed	\$4.7	3.3%	0.8%
Mortgage Backed	\$4.6	3.2%	0.8%
Foreign	\$3.1	2.2%	0.5%
Other	\$2.6	1.8%	0.5%
Muni	\$0.3	0.2%	0.1%
<b>Total Alternative Assets</b>	<b>\$159.6</b>	<b>100.0%</b>	<b>27.6%</b>
Private Equity	\$47.0	29.5%	8.1%
Real Estate	\$46.2	28.9%	8.0%
Hedge Funds	\$33.4	20.9%	5.8%
Balanced	\$33.0	20.7%	5.7%
<b>Cash &amp; Cash Equivalents</b>	<b>\$6.6</b>	<b>100.0%</b>	<b>1.1%</b>

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

## **LIQUIDITY PROFILE**

Benefits payments totaled approximately \$25.7 million during the year and along with other payments of \$1.2 million resulted in total cash outflows of \$26.9 million in 2019. These payments were partially offset by contributions of approximately \$17 million from the employer and plan members and other cash receipts of \$2 million for a total of \$19 million in 2019. This resulted in a negative cash flow of approximately \$7.9 million for the fiscal year. Note that these figures do not incorporate expected income and asset gains from the System's investments. The System's portfolio is structured with a long-term expected return of 7.10%.



## Actuarial Section



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May 27, 2020

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, 2020 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 10-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. The previous valuation was performed as of January 1, 2019. The assumptions and methods used for funding purposes meet the parameters set by Actuarial Standards of Practice (ASOPs).

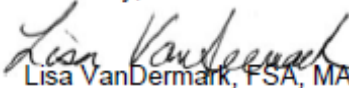
Segal has prepared, and included as part of this report, the following supporting schedules for the Actuarial Section of the December 31, 2019 CAFR:

- 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  
May 27, 2020  
Page 2

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 and actuary. Unless stated otherwise, the actuarial assumptions are based upon the actuarial valuation as of January 1, 2020.

### Mortality Rates

<i>Pre-Retirement:</i>	RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017
<i>Healthy:</i>	RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2017
<i>Disabled:</i>	RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward 1 year projected generationally with Scale MP-2017

The mortality tables reasonably reflect the projected mortality experience of the Plan as of the measurement date based on historical and current demographic data. As part of the analysis, a comparison was made between the actual number of retiree deaths and the projected number based on the prior years' assumptions over the five most recent valuations. The mortality tables were then adjusted to future years using generational projection under Scale MP-2017 to reflect future mortality improvement.

### Termination Rates before Retirement

Age	Mortality		
	Male	Female	Disability
20	0.05	0.02	0.01
25	0.06	0.02	0.02
30	0.06	0.02	0.03
35	0.07	0.03	0.06
40	0.08	0.04	0.10
45	0.13	0.07	0.15
50	0.22	0.12	0.19
55	0.36	0.19	0.24
60	0.61	0.27	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 (%)	
	Withdrawal	
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	2.0	
30+	0.0	

The termination rates and disability rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and disability retirements and the projected number based on the prior years' assumptions over the five most recent valuations..

## Retirement Rates

Age	Rate per year (%)	
	Male	Female
50	0.750	1.125
51	0.750	1.125
52	0.750	1.500
53	0.750	1.875
54	1.500	1.875
55	1.500	4.125
56	1.875	4.875
57	1.875	4.875

Age	Rate per year (%)	
	Male	Female
58	3.750	4.875
59	4.875	4.875
60	9.000	3.750
61	15.000	9.750
62	22.500	11.250
63	18.750	9.375
64	16.500	13.500
65	30.000	11.250
66	18.750	15.000
67	18.750	15.000
68	22.500	18.750
69	22.500	15.000
70	100.000	100.000

The retirement rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements by age and the projected number based on the prior years' assumptions over the five most recent valuations.

### **Retirement Age for Inactive Vested Participants**

Age 55.

The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect economic conditions of the area and 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. None are assumed to have dependent children. 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

7.10%

## 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

\$ 525,000 for calendar 2020, increasing 3.00% per year.

## 2019 Salary

2019 salary equal to salaries provided in the data, except for new hires where salaries were annualized based on date of hire.

## Total Service

Total creditable service reported in the data.

## Net 3(8)(c) Liability

Estimated reduction in liability of \$10.1 million based on average amount of net 3(8)(c) disbursements over prior two years.

## **Actuarial Value of Assets**

Fair 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 fair value return and the expected fair value return and is recognized over a five-year period, further adjusted, if necessary, to be within 10% of the fair 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 \$10,000,000 for fiscal 2021 and increases 12.05% per year for fiscal 2022 through fiscal 2029 with an 11.11% increase in fiscal 2030 to fully fund the System by June 30, 2030. Gains and losses are fully amortized 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 cost of living adjustment was increased from 3% of the first \$13,000 to 3% of the first \$14,000.

## 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	99,700,986	89,902	2.20
1/1/2020	1,105	102,150,661	92,444	2.83

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

Year ended	Added to Rolls		Removed from Rolls		Rolls at end of year		% Increase in annual allowances	Average annual allowances
	Number	Annual Allowances <sup>1</sup>	Number	Annual Allowances	Number	Annual Allowances <sup>1</sup>		
2012	61	\$2,380,699	5	\$61,467	397	\$11,069,722	30.6	\$27,883
2014	91	3,658,868	12	251,979	476	14,581,693	31.7	30,634
2016	80	3,727,766	20	532,663	536	17,977,080	23.3	33,539
2017	53	2,310,558	7	248,508	582	20,234,689	12.6	34,768
2018	51	2,805,364	8	208,025	625	23,031,639	13.8	36,851
2019	54	2,906,730	7	146,076	672	26,098,021	13.3	38,836

<sup>1</sup> Annual allowances are shown for retirees in pay status at the end of the year.

## IV. Solvency Test

Valuation Date	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	142,699,213	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

## V. Analysis of Financial Experience

	Year Ended December 31				
	2019	2018	2017	2016	2015
1. Unfunded actuarial accrued liability as of January 1	\$65,624,665	\$27,708,639	\$18,003,188	\$3,124,466	\$7,645,918
2. Normal cost as of January 1	13,259,656	12,286,819	11,832,822	11,609,396	11,162,881
3. Employer and employee contributions during year	(17,036,334)	(16,483,873)	(12,368,747)	(13,390,164)	(16,561,659)
4. Interest					
(a) For whole year on (1) + (2)	5,719,113	2,999,659	2,237,700	1,141,874	1,457,682
(b) For half year on (3)	<u>(558,950)</u>	<u>(559,235)</u>	<u>(419,625)</u>	<u>(469,220)</u>	<u>(580,356)</u>
(c) Total interest	\$5,160,163	\$2,440,424	\$1,818,075	\$672,654	\$877,326
5. Expected unfunded actuarial accrued liability	67,008,150	25,952,009	19,285,338	2,016,352	3,124,466
6. Actual unfunded actuarial accrued liability	87,425,639	65,624,665	27,708,639	18,003,188	
7. (Gain) or loss for the year: (6) – (5)	<u>\$20,417,489</u>	<u>\$39,672,656</u>	<u>\$8,423,301</u>	<u>\$15,986,836</u>	
8. Investment (gain) or loss	\$6,522,100	\$15,130,942	\$736,876	\$9,784,085	
9. (Gains) or losses from sources other than investments	3,388,373	3,114,042	(290,925)	(10,480,258)	
10. Plan changes		5,026,543	--	2,050,275	
11. Assumption changes	10,507,016	16,401,129	7,977,350	14,632,734	

## 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:

<b>Age Last Birthday at Date of Retirement</b>			
<b>Percent</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 4</b>
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**

<b>Percent</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 4</b>
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**

<b>Percent</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 4</b>
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 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 \$15,000 of a retirement allowance.

## Changes in Plan Provisions

None.

## 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)
01/01/20	\$ 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%
01/01/09	222,477,000	301,652,000	79,175,000	73.75%	82,314,000	96.2%
01/01/07	211,716,000	255,962,000	44,246,000	82.71%	75,444,000	58.6%

Please refer to the ten-year schedule of employer contributions (page 34) 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 Comprehensive Annual 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>	73-74
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>	75
This schedule presents trend data about retired members by type of benefit.	
<b>Schedule of Average Benefit Payments</b>	76
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>
2010	\$ 7,505,077	8,150,055	34,708,095	806,485	51,169,712
2011	7,544,647	5,511,524	2,314,175	935,138	16,305,484
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

(a) Information derived from audited financial statements (2012 - 2019) and unaudited Annual Statement of Financial Condition filed with PERAC (2010 - 2011)

(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>
2010	\$ 8,115,183	315,600	8,430,784	386,282	202,076	9,019,142
2011	9,163,784	408,826	9,572,610	347,356	209,900	10,129,866
2012	10,279,649	223,082	10,502,731	383,802	244,310	11,130,843
2013	11,773,192	72,299	11,845,491	410,778	622,410	12,878,679
2014	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

(a) Information derived from audited financial statements (2012 - 2019) and unaudited Annual Statement of Financial Condition filed with PERAC (2010- 2011)

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

<u>Year</u>	<u>Total Change in Fiduciary Net Position</u>
2010	\$ 42,150,570
2011	6,175,618
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

(a) Information derived from audited financial statements (2012 -2019) and unaudited Annual Statement of Financial Condition filed with PERAC (2010 - 2011)

**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>
2010	\$ 4,507,903	1,398,180	453,569	1,755,531	8,115,183
2011	4,971,773	1,613,513	600,961	1,977,537	9,163,784
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

\*COLA included in pension benefits

(a) Source: MWRA ERS Staff

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

	12/31/2019	12/31/2018	12/31/2017	12/31/2016
<b>Superannuation</b>				
Under \$10,000	8	9	9	9
\$10,000 - \$19,999	65	75	74	77
\$20,000 - \$29,999	113	112	113	112
\$30,000 - \$39,999	93	88	85	75
\$40,000 - \$49,999	85	73	69	57
\$50,000 - \$59,999	47	39	31	29
\$60,000 - \$69,999	35	28	25	18
\$70,000 - \$79,999	30	24	18	17
\$80,000 & over	33	26	17	11
<b>Total</b>	<b>509</b>	<b>474</b>	<b>441</b>	<b>405</b>
<b>Ordinary Disability</b>				
Under \$10,000	1	2	1	1
\$10,000 - \$19,999	4	3	4	4
\$20,000 - \$29,999	3	3	3	3
\$30,000 - \$39,999	5	5	5	5
\$40,000 - \$49,999	0	0	0	0
\$50,000 - \$59,999	1	1	1	1
\$60,000 - \$69,999	0	0	0	0
\$70,000 - \$79,999	0	0	0	0
\$80,000 & over	0	0	0	0
<b>Total</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>14</b>
<b>Accidental Disability</b>				
Under \$10,000	0	0	0	0
\$10,000 - \$19,999	0	1	1	0
\$20,000 - \$29,999	5	5	5	6
\$30,000 - \$39,999	14	14	15	17
\$40,000 - \$49,999	22	21	21	17
\$50,000 - \$59,999	14	11	8	8
\$60,000 - \$69,999	3	2	2	1
\$70,000 - \$79,999	1	1	0	0
\$80,000 & over	1	1	0	0
<b>Total</b>	<b>60</b>	<b>56</b>	<b>52</b>	<b>49</b>
<b>Beneficiaries</b>				
Under \$10,000	9	12	11	12
\$10,000 - \$19,999	37	32	33	29
\$20,000 - \$29,999	26	23	19	16
\$30,000 - \$39,999	9	8	8	6
\$40,000 - \$49,999	7	5	4	4
\$50,000 - \$59,999	0	0	0	0
\$60,000 - \$69,999	1	1	0	0
\$70,000 - \$79,999	0	0	0	1
\$80,000 & over	0	0	0	0
<b>Total</b>	<b>89</b>	<b>81</b>	<b>75</b>	<b>68</b>
<b>Total Retired Members</b>				
Under \$10,000	18	23	21	22
\$10,000 - \$19,999	106	111	112	110
\$20,000 - \$29,999	147	143	140	137
\$30,000 - \$39,999	121	115	113	103
\$40,000 - \$49,999	114	99	94	78
\$50,000 - \$59,999	62	51	40	38
\$60,000 - \$69,999	39	31	27	19
\$70,000 - \$79,999	31	25	18	18
\$80,000 & over	34	27	17	11
<b>Total</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	2019			2018			2017		
	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	1,851	40,642	9	1,825	40,642	9	1,777	40,642	9
5 - 10	2,123	45,317	15	2,109	46,732	15	2,070	45,140	13
10 - 15	1,885	60,348	159	1,818	59,987	158	1,805	59,673	156
15 - 20	2,461	65,643	129	2,395	64,148	126	2,340	63,383	125
20 - 25	3,165	75,222	127	3,088	74,843	122	3,009	73,207	115
25 - 30	4,146	84,073	132	4,081	82,855	119	3,939	81,378	105
30 - 35	5,230	90,231	71	5,031	88,636	50	4,980	85,309	39
35 - 40	6,523	106,688	24	6,744	110,265	21	6,123	101,886	15
40 - 45	5,526	100,475	5	5,544	105,415	4	5,393	88,480	4
45 - 50	4,509	67,556	1	4,474	67,556	1	4,441	67,556	1

Years of Credited Service	2016		
	Average Monthly Benefit (\$)	Final Average Salary (\$)	Number of Retired Members
0 - 5	1,910	42,929	8
5 - 10	2,042	45,140	13
10 - 15	1,792	59,542	152
15 - 20	2,363	63,389	119
20 - 25	2,960	72,292	109
25 - 30	3,906	80,907	90
30 - 35	4,706	82,395	27
35 - 40	5,816	97,648	13
40 - 45	5,368	88,480	4
45 - 50	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.