

In the opinion of Bond Counsel, under existing law and assuming continued compliance with the Internal Revenue Code of 1986, as amended, interest on the 2019 Bonds is not included in gross income for federal income tax purposes and is not an item of tax preference for the purpose of computing the alternative minimum tax imposed on individuals. In the opinion of Bond Counsel, the 2019 Bonds, their transfer and the income therefrom, including any profit made on the sale thereof, are exempt from Massachusetts personal income taxes and the 2019 Bonds are exempt from Massachusetts personal property tax. For federal and Massachusetts tax purposes, interest includes original issue discount. See “Tax Exemption” herein.



MASSACHUSETTS WATER RESOURCES AUTHORITY
\$125,000,000 General Revenue Bonds, 2019 Series B
\$19,190,000 General Revenue Refunding Bonds, 2019 Series C (Green Bonds)

Dated: Date of Initial Delivery

Due: As shown on the inside cover

The Massachusetts Water Resources Authority (the “Authority”) will issue its General Revenue Bonds, 2019 Series B (the “Series B Bonds”) and its General Revenue Refunding Bonds, 2019 Series C (Green Bonds) (the “Series C Bonds,” and together with the Series B Bonds, the “2019 Bonds”) as fully registered bonds in the name of Cede & Co., as nominee for The Depository Trust Company (“DTC”), New York, New York. Purchases of the 2019 Bonds will be made in book-entry form only, in the denominations of \$5,000 or any integral multiple thereof, and no physical delivery of the 2019 Bonds will be made to purchasers. So long as Cede & Co. is the registered owner of the 2019 Bonds, principal and interest on the 2019 Bonds are payable to DTC by U.S. Bank National Association, as Trustee. See “The 2019 Bonds - Book-Entry-Only System.”

The 2019 Bonds will bear interest at the fixed rates and mature in the years and in the principal amounts set forth on the inside cover hereof. Interest on the 2019 Bonds will accrue from their date of delivery. Interest on the 2019 Bonds will be payable on February 1 and August 1, commencing on August 1, 2019. The Series B Bonds will be subject to optional and mandatory sinking fund redemption prior to maturity, as more fully described herein. The Series C Bonds will not be subject to redemption prior to maturity.

The 2019 Bonds will constitute general obligations of the Authority. In addition, the 2019 Bonds will be secured by a lien on and pledge of certain revenues and other moneys of the Authority, as described herein. Neither The Commonwealth of Massachusetts (the “Commonwealth”) nor any political subdivision thereof shall be obligated to pay the principal of, premium, if any, or interest on any 2019 Bond, and neither the faith and credit nor the taxing power of the Commonwealth or any political subdivision thereof is pledged to such payment. The Authority has no taxing power.

The 2019 Bonds are offered when, as and if issued by the Authority and received by the Underwriters, subject to the approval of legality by McCarter & English, LLP, Boston, Massachusetts, Bond Counsel, and certain other conditions. Certain legal matters will be passed upon for the Authority by its Disclosure Counsel, Greenberg Traurig, LLP, Boston, Massachusetts, and for the Underwriters by their counsel, Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts. Delivery of the 2019 Bonds to DTC or its custodial agent is expected in New York, New York on or about May 22, 2019.

Morgan Stanley

BofA Merrill Lynch

Barclays

Citigroup

J.P. Morgan

Goldman, Sachs & Co. LLC

Jefferies

Ramirez & Co., Inc.

RBC Capital Markets

Wells Fargo Securities

May 8, 2019

[†]See “Ratings” herein.

\$125,000,000
Massachusetts Water Resources Authority
General Revenue Bonds, 2019 Series B
Maturities, Amounts, Rates, Prices or Yields and CUSIP Numbers

<u>Year</u> <u>(August 1)</u>	<u>Amount</u>	<u>Interest</u> <u>Rate</u>	<u>Yield</u>	<u>CUSIP</u> [†]
2023	\$ 3,735,000	5.00%	1.56%	576051TW6
2024	10,750,000	5.00	1.58	576051TX4
2025	9,750,000	5.00	1.61	576051TY2
2026	2,500,000	5.00	1.65	576051TZ9
2027	9,000,000	5.00	1.70	576051UA2
2028	9,000,000	5.00	1.76	576051UB0
2029	10,000,000	5.00	1.83	576051UC8
2030	4,815,000	5.00	1.90*	576051UD6
2031	3,435,000	5.00	1.99*	576051UE4
2032	3,610,000	5.00	2.08*	576051UF1
2033	3,800,000	5.00	2.14*	576051UG9
2034	3,990,000	5.00	2.20*	576051UH7
2035	6,020,000	5.00	2.26*	576051UJ3
2036	6,400,000	5.00	2.30*	576051UK0
2037	6,705,000	5.00	2.34*	576051UL8
2038	7,045,000	5.00	2.38*	576051UM6
2039	7,670,000	5.00	2.41*	576051UN4

\$16,775,000 5.00% Term Bond Due August 1, 2044 to Yield 2.53%* CUSIP[†]: 576051UP9

\$19,190,000
Massachusetts Water Resources Authority
General Revenue Refunding Bonds, 2019 Series C (Green Bonds)
Maturities, Amounts, Rates, Prices or Yields and CUSIP Numbers

<u>Year</u> <u>(August 1)</u>	<u>Amount</u>	<u>Interest</u> <u>Rate</u>	<u>Yield</u>	<u>CUSIP</u> [†]
2021	\$11,560,000	5.00%	1.54%	576051UQ7
2022	7,630,000	5.00	1.55	576051UR5

* Yield to first optional redemption date of August 1, 2029.

† CUSIP is a registered trademark of the American Bankers Association. CUSIP Global Services (CGS) is managed on behalf of the American Bankers Association by S&P Global Market Intelligence. Copyright © 2019 CUSIP Global Services. All rights reserved. The CUSIP numbers herein are not intended to create a database and do not serve in any way as a substitute for CUSIP service. The CUSIP numbers have been assigned by an independent company not affiliated with the Authority, the Trustee or the Underwriters and are included solely for the convenience of the bondholders. None of the Authority, the Trustee or the Underwriters shall be responsible for the selection or correctness of the CUSIP numbers set forth above. The CUSIP numbers are subject to being changed after the issuance of the 2019 Bonds as a result of various subsequent actions including, but not limited to, a refunding in whole or in part of the 2019 Bonds. None of the Authority, the Trustee or the Underwriters have agreed to, nor is there any duty or obligation to, update this Official Statement to reflect any change or correction in the CUSIP numbers printed herein.

The information set forth herein has been obtained from the Authority, DTC and other sources that are deemed to be reliable but, as to information from sources other than the Authority, it is not to be construed as a representation of the Authority. The information and expressions of opinion herein are subject to change without notice, and neither the delivery of this Official Statement nor any sale of the 2019 Bonds shall under any circumstances create any implication that there has been no change in the affairs of the Authority since the date hereof.

No dealer, broker, salesperson or other person has been authorized to give any information or to make any representation other than as contained in this Official Statement and, if given or made, such other information or representation must not be relied upon as having been authorized by the Authority. This Official Statement does not constitute an offer to sell or the solicitation of an offer to buy nor shall there be any sale of the 2019 Bonds by any person in any jurisdiction in which it is unlawful for such person to make such offer, solicitation or sale.

In connection with the offering of the 2019 Bonds, the Underwriters may over allot or effect transactions that stabilize or maintain the market price of such 2019 Bonds at levels above those which might otherwise prevail in the open market. Such stabilizing, if commenced, may be discontinued at any time.

The Underwriters have provided the following sentence for inclusion in this Official Statement: The Underwriters have reviewed the information in this Official Statement in accordance with, and as part of, their respective responsibilities to investors under the federal securities laws as applied to the facts and circumstances of this transaction, but the Underwriters do not guarantee the accuracy or completeness of such information.

INFORMATION IN THIS OFFICIAL STATEMENT, INCLUDING THE APPENDICES, THAT HAS BEEN PROVIDED BY THE CONSULTING ENGINEER, HAS BEEN INCLUDED IN RELIANCE UPON CDM SMITH INC. AS EXPERTS.

THIS OFFICIAL STATEMENT, INCLUDING THE APPENDICES, CONTAINS FORECASTS, PROJECTIONS AND ESTIMATES THAT ARE BASED ON CURRENT EXPECTATIONS OR ASSUMPTIONS. IF AND WHEN INCLUDED IN THIS OFFICIAL STATEMENT, THE WORDS "EXPECTS," "FORECASTS," "PROJECTS," "INTENDS," "ANTICIPATES," "ESTIMATES," "ASSUMES" AND ANALOGOUS EXPRESSIONS ARE INTENDED TO IDENTIFY FORWARD-LOOKING STATEMENTS. ANY SUCH STATEMENTS INHERENTLY ARE SUBJECT TO A VARIETY OF RISKS AND UNCERTAINTIES THAT COULD CAUSE ACTUAL RESULTS TO DIFFER MATERIALLY FROM THOSE THAT HAVE BEEN PROJECTED. SUCH RISKS AND UNCERTAINTIES INCLUDE, AMONG OTHERS, GENERAL ECONOMIC AND BUSINESS CONDITIONS, CHANGES IN POLITICAL, SOCIAL AND ECONOMIC CONDITIONS, REGULATORY INITIATIVES AND COMPLIANCE WITH GOVERNMENTAL REGULATIONS, LITIGATION AND VARIOUS OTHER EVENTS, CONDITIONS AND CIRCUMSTANCES, MANY OF WHICH ARE BEYOND THE CONTROL OF THE AUTHORITY. THESE FORWARD-LOOKING STATEMENTS SPEAK ONLY AS OF THE DATE OF THIS OFFICIAL STATEMENT. THE AUTHORITY DOES NOT PLAN TO ISSUE ANY UPDATE OR REVISION TO ANY FORWARD-LOOKING STATEMENT CONTAINED HEREIN TO REFLECT ANY CHANGE IN THE AUTHORITY'S EXPECTATIONS WITH REGARD THERETO OR ANY CHANGE IN EVENTS, CONDITIONS OR CIRCUMSTANCES ON WHICH ANY SUCH STATEMENT IS BASED, SUBJECT TO ITS CONTRACTUAL OBLIGATIONS OF CONTINUING DISCLOSURE AS DESCRIBED HEREIN.

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MASSACHUSETTS WATER RESOURCES AUTHORITY

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PFM Financial Advisors LLC

Bond Counsel

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Independent Accountants

CliftonLarsenAllen LLP

Consulting Engineer

CDM Smith Inc.

Disclosure Counsel

Greenberg Traurig, LLP

Bond Trustee

U.S. Bank National Association

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OFFICIAL STATEMENT
OF THE
MASSACHUSETTS WATER RESOURCES AUTHORITY
RELATING TO

\$125,000,000 General Revenue Bonds, 2019 Series B
\$19,190,000 General Revenue Refunding Bonds, 2019 Series C (Green Bonds)

The following introductory statement is subject in all respects to more complete information contained elsewhere in this Official Statement. The order and placement of materials in this Official Statement, including the Appendices hereto, are not to be deemed to be a determination of relevance, materiality or relative importance, and this Official Statement, including the cover page, the inside cover page, and Appendices, should be considered in its entirety. All capitalized terms used in this Official Statement that are not otherwise defined herein shall have the meanings ascribed to them in Appendix C.

INTRODUCTION

Purpose. This Official Statement provides certain information concerning the Massachusetts Water Resources Authority (the “Authority” or “MWRA”) in connection with the sale of \$125,000,000 aggregate principal amount of the Authority’s General Revenue Bonds, 2019 Series B (the “Series B Bonds”) and \$19,190,000 aggregate principal amount of the Authority’s General Revenue Refunding Bonds, 2019 Series C (Green Bonds) (the “Series C Bonds,” and together with the Series B Bonds, the “2019 Bonds”). The 2019 Bonds are to be issued under and secured by the Authority’s Amended and Restated General Revenue Bond Resolution, effective as of April 23, 2015 (as amended and supplemented, the “General Bond Resolution”). In addition, the 2019 Bonds will be issued and secured under the Authority’s Eightieth Supplemental Resolution, approved by the Authority by resolution adopted on February 20, 2019 (the “Supplemental Resolution” and collectively with the General Bond Resolution, the “General Resolution”). The 2019 Bonds will constitute valid and binding general obligations of the Authority and will be further secured by a pledge of certain revenues of the Authority in accordance with the terms of the General Resolution. See “Security for the 2019 Bonds - General,” and “- Outstanding Indebtedness and Additional Indebtedness.” Terms used, and not otherwise defined, in this Official Statement are defined in Appendix C - “Summary of Certain Provisions of the General Resolution.”

The 2019 Bonds are secured on a parity basis with all other senior revenue Bonds issued under the General Resolution. The proceeds of the Series B Bonds will be used to finance capital improvements to the Authority’s systems and facilities. The proceeds of the Series C Bonds will be used to refund certain of the Authority’s Outstanding Bonds (the “Refunded Bonds”). See “Application of Bond Proceeds and Other Moneys,” “Plan of Refunding,” and Appendix E - “Table of Refunded Bonds.”

The Authority. The Authority, established by the Massachusetts Water Resources Authority Act, Chapter 372 of the Acts of 1984 of The Commonwealth of Massachusetts (as amended, the “Act”), is a body politic and corporate, a public instrumentality and an independent public authority of The Commonwealth of Massachusetts (the “Commonwealth”). In 1985, the Authority assumed possession and control from the Metropolitan District Commission, a department of the Commonwealth (the “MDC”) (which became part of the Department of Conservation and Recreation (the “DCR”) in July 2003), of a water distribution system (the “Waterworks System”) and a sewer system (the “Sewer System,” and together with the Waterworks System, the “Systems”). Pursuant to the Act, the Authority is authorized to provide wholesale services in service areas encompassing, in whole or in part, 62 communities located primarily in eastern Massachusetts, including most of the metropolitan Boston area. Fifty-three cities, towns and special purpose entities (collectively, “Local Bodies”) currently are authorized by the Act to receive water from the Waterworks System. Forty-three Local Bodies, included in the Act as originally adopted, connect their local sewer systems to the regional sewage collection and treatment facilities constituting the Sewer System. In addition, the Authority provides wholesale wastewater services to two communities in Central Massachusetts. Approximately 3.0 million people, or approximately 44% of the total population of the Commonwealth, live in the Authority’s service areas. See “The Authority and its Service Areas.”

Rates and Charges. The Authority's primary source of revenue is the wholesale rates and charges assessed to the Local Bodies. In Fiscal Year 2019 (July 1, 2018 through June 30, 2019), approximately 96.2% of the Authority's revenues are budgeted to be derived from such assessed rates and charges. One Local Body, the Boston Water and Sewer Commission (the "BWSC"), a public instrumentality of the Commonwealth providing retail water and sewer services within the City of Boston, is budgeted to account for approximately 31.4% of the Authority's combined water and sewer charges in Fiscal Year 2019. The obligation to pay the Authority's rates and charges for services rendered is a general obligation of each Local Body, supported by its full faith and credit and payable from all available revenue sources, including local retail user charges and, in the case of city and town Local Bodies ("Municipal Local Bodies") only, real and personal property taxes and financial aid distributed to such Municipal Local Bodies by the Commonwealth ("local aid"). No specific revenues of the Local Bodies, however, are pledged for the payment of the Authority's wholesale rates and charges. Since its inception, the Authority has collected 100% of its rates and charges within the Fiscal Year in which they were due.

The Authority is required by the Act to set its rates and charges at levels sufficient, together with other available revenues, to pay, among other things, its current expenses and its debt service, and is required by the General Resolution to provide debt service coverage at specified levels. In accordance with the Act, the Authority's rate-setting responsibility is exercised by its Board of Directors independent of the approval of any department, agency or other instrumentality of the Commonwealth or any other governmental body. The Authority's rate-setting is not subject to certain limitations imposed by the Massachusetts law, commonly known as "Proposition 2½," on the rate of growth of assessments by state and other governmental entities on municipalities. See "Local Bodies - Municipal Sources of Revenue."

From Fiscal Year 2015 through Fiscal Year 2019, the average annual increase in the Authority's assessed rates and charges was approximately 3.3%, with an approximate 3.1% increase in Fiscal Year 2019. See "Rates and Charges - Historical Rates and Charges" and "Management's Review of Operating Results - Fiscal Year 2019 Current Expense Budget and Third Quarter Results." The Authority continues to believe that the economic and environmental benefits of an improved water and wastewater infrastructure help to maintain public support for its services and expects that these considerations, together with the statutory enforcement mechanisms available to it for collection of its rates and charges, will continue to assure that the Authority's revenue requirements are met. See "Rates and Charges - Future Rates and Charges" and "- Enforcement."

Capital Improvement Program. In addition to its operating responsibilities, the Authority is responsible for rehabilitating, repairing and maintaining the Systems and for operating them in compliance with applicable environmental laws, including the requirements of the federal Safe Drinking Water Act (the "SDWA") and the federal Clean Water Act. Since its assumption of the ownership and operations of the Systems in 1985, the Authority has undertaken an extensive program of capital improvements to the Systems through the implementation of rolling capital improvement programs (the "CIP"). Capital expenditures since the Authority's inception through December 31, 2018 totaled more than \$8.4 billion. The Authority's most significant project to date, the Deer Island Wastewater Treatment Plant and related facilities (the "Deer Island Treatment Plant Project") was completed at an approximate cost of \$3.8 billion. The Authority also has completed the construction of all facilities included in its long-term plan for control of combined sewer overflows (CSOs) (the "CSO Control Plan," and together with the Deer Island Treatment Plant Project, the "Boston Harbor Project"), at an approximate cost of \$908.0 million, and several large sewer interceptor projects, as well as significant capital improvements to the Waterworks System, including the MetroWest Water Supply Tunnel, the Norumbega Covered Storage Reservoir, and the John J. Carroll Water Treatment Plant. The results of the Authority's efforts are demonstrated improvements to the environment as well as to the delivery of its services.

The Authority developed a Master Plan for the Systems, most recently updated in 2018 (the "Master Plan"), in order to assess Authority-wide needs, identify and prioritize projects to address those needs, and establish timeframes to undertake such projects that reflect appropriate fiscal constraints necessary for the Authority to continue to manage increases in its rates and charges. The Master Plan includes capital expenditures over a 40-year period. The Master Plan is a companion document to the CIP, and includes all projects included in the Authority's current capital improvement program for Fiscal Year 2019 (the "FY19 CIP"). The FY19 CIP covers the five-year capital budget period from Fiscal Year 2019 through Fiscal Year 2023, and includes a five-year capital spending cap of approximately \$984.8 million for the five fiscal-year period. For further information on the Master Plan and the CIP, see "Capital Improvement Program" and "Environmental Regulation and Litigation."

Designation of Green Bonds. The Authority is issuing the Series C Bonds as “Green Bonds” due to the adherence of the projects being refinanced through the issuance of the Series C Bonds to the standards of the Clean Water Act and the SDWA. See Appendix F - “Description of Green Bonds Projects.” The purpose of labeling the Series C Bonds as Green Bonds is to allow investors to invest directly in bonds which finance environmentally beneficial projects. Holders of Green Bonds do not assume any specific risk with respect to any of the funded projects. The Authority expects that the projects being financed with the proceeds of the Series B Bonds will likely also meet the standards of the Clean Water Act and the SDWA; however, the final spending plan for these proceeds has not been determined.

Appendices. Attached hereto as Appendix A are the Authority’s audited financial statements at June 30, 2018 and 2017 and for the Fiscal Years then ended. Attached hereto as Appendix B is the Consulting Engineer’s Financial Feasibility Report, dated April 23, 2019 (the “April 2019 Report”), prepared by CDM Smith Inc., the Authority’s consulting engineer (the “Consulting Engineer”), relating to certain financial matters and projections of the Authority, including the Authority’s estimated future rates and charges for Fiscal Years 2020 through 2024. Attached hereto as Appendix C is a Summary of Certain Provisions of the General Resolution prepared by Bond Counsel to the Authority. Attached hereto as Appendix D is the proposed form of legal opinion of Bond Counsel. Attached hereto as Appendix E is a table of Refunded Bonds prepared by Bond Counsel to the Authority. Attached hereto as Appendix F is a Description of the Green Bonds Projects.

Documents. Copies of the General Bond Resolution and the Current Expense Budget and Capital Improvement Program for Fiscal Year 2019 can be obtained from the Authority’s website at www.mwra.com.

THE 2019 BONDS

The following is a summary of certain provisions of the 2019 Bonds. Reference is hereby made to the 2019 Bonds and the General Resolution, each in their entirety, for detailed provisions of the 2019 Bonds. For definitions of certain terms and additional detailed information relating to the 2019 Bonds, see Appendix C - “Summary of Certain Provisions of the General Resolution.”

GENERAL

The 2019 Bonds will be issued in the aggregate principal amount of \$144,190,000, comprising the Series B Bonds in the aggregate principal amount of \$125,000,000, and the Series C Bonds in the aggregate principal amount of \$19,190,000. The 2019 Bonds will be dated as of the date of their initial delivery and will mature in the years and in the principal amounts set forth on the inside cover of this Official Statement. The 2019 Bonds will be offered in Authorized Denominations of \$5,000 and integral multiples thereof.

Interest on the 2019 Bonds will be payable on February 1 and August 1, commencing August 1, 2019, at the interest rates set forth on the inside cover of this Official Statement. The record date for payment of interest on the 2019 Bonds is the 15th day of the calendar month preceding the date on which interest is to be paid. Interest will accrue on the basis of a 360-day year consisting of 12 months of 30 days each.

REDEMPTION

Mandatory Sinking Fund Redemption. The Series B Bonds maturing on August 1, 2044 will be subject to mandatory sinking fund redemption and will be redeemed by sinking fund installments on August 1 of each of the years and in the amounts set forth in the following table at a redemption price equal to 100% of the principal amount thereof plus accrued interest to the date of redemption.

SERIES B BONDS DUE AUGUST 1, 2044

<u>Year</u>	<u>Sinking Fund Installment</u>
2040	\$3,025,000
2041	3,185,000
2042	3,345,000
2043	3,520,000
2044*	3,700,000

*Maturity.

Optional Redemption. The Series B Bonds maturing on or prior to August 1, 2029 will not be subject to redemption prior to maturity. The Series B Bonds maturing after August 1, 2029 will be subject to optional redemption prior to maturity, commencing on August 1, 2029, in whole or in part on any Business Day, at the option of the Authority and in such order of maturity and sinking fund installments within a maturity as may be determined by the Authority, at a redemption price of par plus accrued interest to the date of redemption.

No Redemption of Series C Bonds. The Series C Bonds will not be subject to redemption prior to maturity.

Notice of Redemption and Other Notices. So long as DTC or its nominee is the Bondholder, the Authority and the Trustee will recognize DTC or its nominee as the Bondholder for all purposes, including notices and voting. Conveyance of notices and other communications by DTC to Direct Participants (hereinafter defined), by Direct Participants to Indirect Participants (hereinafter defined), and by Direct Participants and Indirect Participants to Beneficial Owners (hereinafter defined) will be governed by arrangements among them, subject to any statutory and regulatory requirements as may be in effect from time to time.

The Trustee shall give notice of redemption to the Bondholders at least once and not less than 30 days prior to the date fixed for redemption. Failure to mail notice to a particular Bondholder, or any defect in the notice to such Bondholder, shall not affect the redemption of any other Bond. So long as DTC or its nominee is the Bondholder, any failure on the part of DTC or failure on the part of a nominee of a Beneficial Owner (having received notice from a Direct Participant or otherwise) to notify the Beneficial Owner so affected, shall not affect the validity of the redemption.

Notice of optional redemption of any Series B Bonds may and, if the Authority shall so instruct the Trustee, shall be given conditionally. If and to the extent that any conditions specified or referred to in a notice of redemption are not satisfied on or prior to the proposed redemption date and, if not satisfied, are not waived by the Authority, then such Series B Bonds shall not be redeemed pursuant to such notice and shall remain outstanding in accordance with their terms.

Purchase in Lieu of Redemption. In the event that the Authority exercises its right to optionally redeem any Series B Bonds, the Authority may purchase some or all of the Series B Bonds called for redemption if it gives written notice to the Trustee that it wishes to purchase the principal amount of the Series B Bonds specified in the notice, at a purchase price equal to the Redemption Price. On the date specified as the redemption date, the Authority shall cause to be furnished to the Trustee funds in an amount and at the time necessary to permit the Trustee to purchase such Series B Bonds on the redemption date. Any such purchase of Series B Bonds by the Authority shall at the option of the Authority, as designated in the written notice delivered to the Trustee, either be credited against principal or sinking fund installments due on such Series B Bonds, and such Series B Bonds so purchased shall be delivered to the Trustee for cancellation, or shall not be deemed to be a payment or redemption of the Series B Bonds or any portion thereof and such purchase shall not operate to extinguish or discharge the indebtedness evidenced by such Series B Bonds.

Selection for Redemption. In the event that less than all of the Series B Bonds of any maturity are to be redeemed and for so long as the Book-Entry-Only System remains in effect for the Series B Bonds, the portion of any Series B Bond of a particular maturity to be redeemed shall be selected by DTC in such manner as DTC may

determine. If the Book-Entry-Only System for the Series B Bonds is no longer in effect, selection for redemption of less than all the Series B Bonds of any maturity will be made by the Trustee by lot or in any other manner of selection the Trustee in its discretion shall deem appropriate and fair.

BOOK-ENTRY-ONLY SYSTEM

DTC will act as securities depository for the 2019 Bonds. The 2019 Bonds will be issued as fully-registered securities registered in the name of Cede & Co. (DTC's partnership nominee) or such other name as may be requested by an authorized representative of DTC. One fully-registered 2019 Bond certificate will be issued for each maturity within a series of the 2019 Bonds, each in the aggregate principal amount of such maturity, and will be deposited with DTC.

DTC, the world's largest securities depository, is a limited-purpose trust company organized under the New York Banking Law, a "banking organization" within the meaning of the New York Banking Law, a member of the Federal Reserve System, a "clearing corporation" within the meaning of the New York Uniform Commercial Code, and a "clearing agency" registered pursuant to the provisions of Section 17A of the Securities Exchange Act of 1934. DTC holds and provides asset servicing for over 3.5 million issues of U.S. and non-U.S. equity issues, corporate and municipal debt issues, and money market instruments (from over 100 countries) that DTC's participants ("Direct Participants") deposit with DTC. DTC also facilitates the post-trade settlement among Direct Participants of sales and other securities transactions in deposited securities, through electronic computerized book-entry transfers and pledges between Direct Participants' accounts. This eliminates the need for physical movement of securities certificates. Direct Participants include both U.S. and non-U.S. securities brokers and dealers, banks, trust companies, clearing corporations, and certain other organizations. DTC is a wholly-owned subsidiary of The Depository Trust & Clearing Corporation ("DTCC"). DTCC is the holding company for DTC, National Securities Clearing Corporation and Fixed Income Clearing Corporation, all of which are registered clearing agencies. DTCC is owned by the users of its regulated subsidiaries. Access to the DTC system is also available to others such as both U.S. and non-U.S. securities brokers and dealers, banks, trust companies, and clearing corporations that clear through or maintain a custodial relationship with a Direct Participant, either directly or indirectly ("Indirect Participants"). DTC has a Standard & Poor's rating of AA+. The DTC Rules applicable to its Participants are on file with the Securities and Exchange Commission. More information about DTC can be found at www.dtcc.com.

Purchases of 2019 Bonds under the DTC system must be made by or through Direct Participants, which will receive a credit for the 2019 Bonds on DTC's records. The ownership interest of each actual purchaser of each Security ("Beneficial Owner") is in turn to be recorded on the Direct and Indirect Participants' records. Beneficial Owners will not receive written confirmation from DTC of their purchase. Beneficial Owners are, however, expected to receive written confirmations providing details of the transaction, as well as periodic statements of their holdings, from the Direct or Indirect Participant through which the Beneficial Owner entered into the transaction. Transfers of ownership interests in the 2019 Bonds are to be accomplished by entries made on the books of Direct and Indirect Participants acting on behalf of Beneficial Owners. Beneficial Owners will not receive certificates representing their ownership interests in 2019 Bonds, except in the event that use of the book-entry system for the 2019 Bonds is discontinued.

To facilitate subsequent transfers, all 2019 Bonds deposited by Direct Participants with DTC are registered in the name of DTC's partnership nominee, Cede & Co., or such other name as may be requested by an authorized representative of DTC. The deposit of 2019 Bonds with DTC and their registration in the name of Cede & Co. or such other DTC nominee do not affect any change in beneficial ownership. DTC has no knowledge of the actual Beneficial Owners of the 2019 Bonds; DTC's records reflect only the identity of the Direct Participants to whose accounts such 2019 Bonds are credited, which may or may not be the Beneficial Owners. The Direct and Indirect Participants will remain responsible for keeping account of their holdings on behalf of their customers.

Conveyance of notices and other communications by DTC to Direct Participants, by Direct Participants to Indirect Participants, and by Direct Participants and Indirect Participants to Beneficial Owners will be governed by arrangements among them, subject to any statutory or regulatory requirements as may be in effect from time to time.

Redemption notices shall be sent to DTC. If less than all of the 2019 Bonds within a maturity are being redeemed, DTC's practice is to determine by lot the amount of the interest of each Direct Participant in such maturity to be redeemed.

Neither DTC nor Cede & Co. (nor any other DTC nominee) will consent or vote with respect to 2019 Bonds unless authorized by a Direct Participant in accordance with DTC's MMI Procedures. Under its usual procedures, DTC mails an Omnibus Proxy to the Authority as soon as possible after the record date. The Omnibus Proxy assigns Cede & Co.'s consenting or voting rights to those Direct Participants to whose accounts 2019 Bonds are credited on the record date (identified in a listing attached to the Omnibus Proxy).

Principal and interest payments on the 2019 Bonds will be made to Cede & Co., or such other nominee as may be requested by an authorized representative of DTC. DTC's practice is to credit Direct Participants' accounts upon DTC's receipt of funds and corresponding detail information from the Authority or the Trustee, on payable date in accordance with their respective holdings shown on DTC's records. Payments by Participants to Beneficial Owners will be governed by standing instructions and customary practices, as is the case with securities held for the accounts of customers in bearer form or registered in "street name," and will be the responsibility of such Participant and not of DTC (nor its nominee), the Trustee, or the Authority, subject to any statutory or regulatory requirements as may be in effect from time to time. Payment of redemption proceeds, distributions, and dividend payments to Cede & Co. (or such other nominee as may be requested by an authorized representative of DTC) is the responsibility of the Authority or the Trustee, disbursement of such payments to Direct Participants will be the responsibility of DTC, and disbursement of such payments to the Beneficial Owners will be the responsibility of Direct and Indirect Participants.

DTC may discontinue providing its services as depository with respect to the 2019 Bonds at any time by giving reasonable notice to the Authority or the Trustee. Under such circumstances, in the event that a successor depository is not obtained, 2019 Bond certificates are required to be printed and delivered.

The Authority may decide to discontinue use of the system of book-entry-only transfers through DTC (or a successor securities depository). In that event, 2019 Bond certificates will be printed and delivered to DTC.

The information contained in this section concerning DTC and DTC's book-entry system has been obtained from sources that the Authority believes to be reliable, but the Authority takes no responsibility for the accuracy thereof. Neither the Trustee nor the Authority will have any responsibility or obligation to the Direct Participants or the persons for whom they act as nominees with respect to the payments to the Direct Participants, the Indirect Participants or Beneficial Owners.

EXCHANGE AND TRANSFER

If for any reason the Book-Entry-Only System is discontinued, the 2019 Bonds will be exchangeable and transferable on the registration books of the Authority at the designated corporate trust office of the Trustee in Authorized Denominations of \$5,000 and integral multiples thereof. Upon presentation and surrender of any 2019 Bond for transfer or exchange, the Trustee will authenticate and deliver in the name of the designated transferee or transferees or the registered owner, as appropriate, one or more new fully registered 2019 Bonds of the same series and maturity in any Authorized Denomination or Denominations. For every exchange or transfer of 2019 Bonds, the Authority or the Trustee may make a charge sufficient to reimburse it for any tax, fee or other governmental charge required to be paid with respect to such exchange or transfer. The Authority shall not be obligated to make any transfer or exchange of any 2019 Bonds during the 15-day period preceding an interest or principal payment date. Neither the Authority nor the Trustee shall be required to transfer or exchange the Series B Bonds for a period of 15 days next preceding the mailing of any notice of redemption or to transfer or exchange any Series B Bond called for redemption.

APPLICATION OF BOND PROCEEDS AND OTHER MONEYS

GENERAL

The proceeds of the 2019 Bonds are expected to be applied on the date of issue of the 2019 Bonds in the estimated amounts as follows (rounded to the nearest dollar):

SOURCES OF FUNDS:

Principal Amount of 2019 Bonds	\$144,190,000
Original Issue Premium.....	<u>31,293,546</u>
TOTAL	\$175,483,546

USE OF FUNDS:

Deposit to Construction Fund	\$152,136,473
Deposit to Refunding Trust Fund.....	20,751,918
Deposit to Debt Service Reserve Fund.....	1,628,538
Costs of Issuance*	<u>966,617</u>
TOTAL	\$175,483,546

* Includes Underwriters' discount.

PLAN OF REFUNDING

A portion of the proceeds of the Series C Bonds, together with certain amounts available under the General Resolution, will be deposited into the Refunding Trust Fund established under a Refunding Trust Agreement (the "Refunding Trust Agreement") to be entered into between the Authority and U.S. Bank National Association, as trustee for those Bonds identified in Appendix E hereto (collectively, the "Refunded Bonds"). Such amounts will be invested in Defeasance Obligations, and will be applied to pay the redemption prices of plus accrued interest on all Refunded Bonds on the redemption date, as set forth in Appendix E. Such refunding is contingent upon delivery of the 2019 Bonds.

SECURITY FOR THE 2019 BONDS

GENERAL

The following summary of the security for the 2019 Bonds is qualified in its entirety and reference is hereby made to Appendix C hereto and to the General Resolution, which set forth in further detail provisions relating to the security for the 2019 Bonds. For definitions of certain capitalized terms used but not defined herein, see Appendix C - "Summary of Certain Provisions of the General Resolution."

The 2019 Bonds constitute valid and binding general obligations of the Authority and the full faith and credit of the Authority is pledged to the payment of the principal and redemption price of and interest on the 2019 Bonds. The Authority is subject to suit, but its property is not generally subject to attachment or levy by execution to satisfy a judgment on the 2019 Bonds. The Authority has no taxing power.

Neither the Commonwealth nor any political subdivision thereof shall be obligated to pay the principal of or premium or interest on any 2019 Bond, and neither the faith and credit nor taxing power of the Commonwealth or of any political subdivision thereof is pledged to such payment.

The General Resolution provides for the issuance of senior revenue bonds and subordinated revenue bonds thereunder. The Authority may issue additional bonds on a parity with the 2019 Bonds and the other senior revenue bonds issued to date (collectively, "Bonds") upon the satisfaction of certain conditions. See "Security for the 2019 Bonds - Outstanding and Additional Indebtedness," and Appendix C - "Summary of Certain Provisions of the General Resolution - Additional Indebtedness," "- Conditions Precedent to Delivery of a Series of Bonds," and "- Conditions Precedent to Delivery of a Series of Parity or Senior Secured Bonds." All Bonds are equally and ratably

secured under the provisions of the General Resolution and by the Funds and Accounts established thereunder, and all Bonds will be on parity with the 2019 Bonds. See “Debt Service Reserve Fund” below.

The General Resolution also permits the issuance of Subordinated Bonds which are referred to herein, together with the Bonds, as “Secured Bonds.” Subordinated Bonds are secured by a pledge of the Revenues of the Authority subordinate to the pledge securing Bonds (only the interest on CP Notes, which constitute Subordinated Bonds, is secured by the subordinated lien on Revenues). In the event of any Event of Default under the General Resolution, so long as there are any Bonds Outstanding, directions to the Trustee with respect to remedies shall be given by a majority of the holders of the Outstanding Bonds, excluding the holders of the Subordinated Bonds. See Appendix C - “Summary of Certain Provisions of the General Resolution - Events of Default,” “- Proceedings Brought by Trustee,” and “- Restrictions on Action by Holders of Secured Bonds.”

The Act limits the total amount of the Authority’s unrefunded bonds and notes that may be Outstanding at any time. See “Financial Operations - Debt Limitation.” For a table showing the debt service on Outstanding Secured Bonds, see “Financial Operations - Outstanding and Proposed Indebtedness.”

NET REVENUE PLEDGE

In the General Resolution, the Authority pledges as security for Bonds, including the 2019 Bonds, (i) its Revenues, (ii) all moneys or securities held in any Fund or Account established under the General Resolution (except the Operating Fund, the Note Payment Fund, the Rebate Fund and any Subordinated Debt Service Reserve Fund) together with all investment earnings thereon (except to the extent such earnings are required to be deposited into the Rebate Fund), and (iii) all other moneys and securities to be received by the Authority or by any Fiduciary pursuant to the General Resolution. In the General Resolution, the Authority further pledges as security for the Subordinated Bonds the property described in clauses (i) through (iii) of the preceding sentence (except monies or securities in the Debt Service Fund and the Debt Service Reserve Fund), subject to the prior pledge for the payment of Bonds described in the preceding sentence. Such pledges are subject to the provisions of the General Resolution regarding the application of Revenues and the other moneys pledged as security for Secured Bonds. For the definition of Revenues see Appendix C - “Summary of Certain Provisions of the General Resolution.”

The General Resolution provides that the Authority shall promptly cause all Revenues received to be deposited in the Revenue Fund held by the Trustee and that prior to application to the Debt Service Fund, the Subordinated Debt Service Fund and the other Funds and Accounts established under the General Resolution, the Revenues on deposit in the Revenue Fund are to be applied to the Authority’s expenses of maintaining, repairing and operating the Systems and engaging in other activities authorized by the Act.

The General Resolution provides that the funds on deposit in the Revenue Fund be transferred by the Trustee on the last Business Day of each month to the following funds and accounts in the following order:

First, to the Operating Fund, an amount necessary to make the amount on deposit therein equal to the Operating Expenses for the next succeeding three months as shown in the Operating Budget of the Authority on file with the Trustee.

Second, to the Debt Service Fund, the amounts necessary on a pro rata basis (i) to make up any deficiency in any Subaccount resulting from an increase in the applicable interest rate on any Variable Rate Bonds over the rate assumed in calculating the amount required for a prior deposit pursuant to the General Resolution, (ii) to increase the amount on deposit in each Subaccount of the Interest Account to equal interest included in Adjusted Debt Service next coming due on Outstanding Bonds of the applicable Series accrued and unpaid and to accrue to and including the last day of the next succeeding month after taking into account any available moneys in the corresponding Subaccount of the Capitalized Interest Account, (iii) to increase the amount on deposit in each Subaccount of the Principal Account to equal that portion of the Principal Installment included in Adjusted Debt Service next coming due (within twelve months) on Outstanding Bonds of the applicable Series accrued and unpaid and to accrue to and including the last day of the next succeeding month, (iv) to increase the amount on deposit in each Subaccount of the Redemption Account to equal the Redemption Price of Outstanding Bonds of

the applicable Series then called for redemption (other than Sinking Fund Installments) as of any date on or prior to the last day of the next succeeding month, and (v) on a pro rata basis to each Subaccount of the Interest Account established with respect to regularly scheduled payments under interest rate swap agreements or other hedge agreements (“regularly scheduled swap payments”) relating to a Series of Bonds, the amount (if any) necessary to increase the amount on deposit in each such Subaccount so that it equals that portion of the regularly scheduled swap payments next coming due with respect to such Series of Bonds accrued and unpaid and to accrue to and including the last day of the next succeeding month.

Third, to the Subordinated Debt Service Fund, the amounts with respect to Subordinated Bonds determined in the same manner as the amounts in the Debt Service Fund set forth in the preceding paragraph with respect to Bonds.

Fourth, to the Debt Service Reserve Fund, to the Common Account therein one-twelfth (1/12) of the amount, if any, necessary to increase the amount on deposit in such Account, determined as of the first day of the Fiscal Year, to an amount equal to the Debt Service Reserve Fund Requirement (provided that no such deposit shall be required in a Fiscal Year following the funding of the Common Account in connection with the issuance of a Series of Bonds, and (ii) the deposit required by any Supplemental Resolution to any Special Account.

Fifth, to the Subordinated Debt Service Reserve Fund, (i) an amount necessary to increase the amount on deposit in each Series Subaccount of the Common Account to equal the level required by any Supplemental Resolution, and (ii) the deposit required by any Supplemental Resolution to any Special Account.

Sixth, to the Commonwealth Obligation Fund, an amount equal to the amount of Commonwealth Obligations payable during the next succeeding month.

Seventh, to the Rebate Fund, the amount of the Rebate Fund Requirement, if any, determined in accordance with the applicable Supplemental Resolution.

Each fund and account must be funded from Revenues to the amount required under the General Resolution before Revenues are transferred to funds and accounts lower in the flow of funds.

On each December 31 and June 30 or, if such day is not a Business Day, on the next preceding Business Day, the Trustee is required under the General Resolution to transfer funds in the Revenue Fund to the Operating Reserve Fund, the Insurance Reserve Fund, the Renewal and Replacement Reserve Fund and the Water Pollution Abatement Fund in the amounts specified in the General Resolution, then to the Revolving Fund, as directed by the Authority, and the remainder to the General Fund except to the extent that the Authority directs that the remainder be retained in the Revenue Fund.

See Appendix C - “Summary of Certain Provisions of the General Resolution - Flow of Funds from the Revenue Fund” for a more detailed explanation of the flow of funds.

COVERAGE COVENANTS

Under the Act and the General Resolution, the Authority is required to meet the following three covenants with respect to Rates and Charges (collectively, the “Coverage Covenants”).

Rate Covenant. Pursuant to the General Resolution, and as required by the Act, the Authority covenants that for each Fiscal Year it will maintain Revenues sufficient to pay Current Expenses, debt service on Indebtedness, required deposits to reserves, costs of maintenance, replacement or improvement of the Systems to be funded as Current Expenses, and all amounts which the Authority may be obligated to pay by any law or contract (the “Rate Covenant”).

Coverage Ratio Covenants. In addition to the Rate Covenant, the Authority is required under the General Resolution to fix and adjust Rates and Charges sufficient to provide Revenues Available for Bond Debt Service in each Fiscal Year in an amount (i) at least equal to debt service for such Fiscal Year on all Outstanding Bonds (which term excludes Subordinated Bonds) multiplied by the Primary Bond Coverage Ratio of 1.2 (the “Primary Bond Coverage Requirement”), and (ii) so long as any Parity Subordinated Bonds shall be Outstanding, for any 12-month period, at least equal to (a) debt service during such 12-month period on all Outstanding Bonds plus debt service during such 12-month period for all Outstanding Parity Subordinated Bonds (b) multiplied by the Secured Bond Coverage Ratio of 1.1 (the “Secured Bond Coverage Ratio”).

The Primary Bond Coverage Ratio may be adjusted by the Authority provided that such adjustment will not adversely affect the then current ratings, if any, assigned to any Series of Outstanding Secured Bonds by each Rating Agency. In any event, the Primary Bond Coverage Ratio shall not be less than 1.1. See Appendix C - “Summary of Certain Provisions of the General Resolution.”

In addition, the Authority may provide for additional subordinated bond coverage requirements in supplemental resolutions authorizing the issuance of Subordinated Bonds (“Subordinated Bond Coverage Requirements”). In such event, the Authority shall also fix and adjust Rates and Charges sufficient to provide Revenues Available for Subordinated Debt Service in each Fiscal Year at least equal to the Subordinated Bond Coverage Requirement. At this time, there is no Subordinated Bond Coverage Requirement in effect in addition to the coverage requirements described in the preceding two paragraphs.

Covenant as to Establishment of Rates; Failure to Comply with Covenants. Under the General Resolution, the Authority covenants to adopt its Rates and Charges strictly in accordance with the Act as in effect on the original effective date of the General Revenue Bond Resolution (*i.e.*, January 24, 1990), which establishment shall be conclusive and final and not subject to supervision or regulation by the Commonwealth or any of its political subdivisions, at a level sufficient to satisfy the Coverage Covenants.

If in any Fiscal Year the Authority shall not comply with the Coverage Covenants, then the Authority shall not be deemed to be in default under the General Resolution so long as it shall specify to the Trustee the corrective steps that it has taken to ensure compliance with the Coverage Covenants for the then current Fiscal Year; retain the Consulting Engineer or a Rate Consultant to review the adequacy of the Authority’s charges with respect to the Systems and to recommend changes necessary for the Authority to be in compliance with the Coverage Covenants; and use its best efforts to effect such changes as recommended by the Consulting Engineer or Rate Consultant. See Appendix C - “Summary of Certain Provisions of the General Resolution - Covenants of the Authority - Covenant as to Rates and Charges; Debt Service Coverage Ratio.”

Operating Reserve Fund and Rate Stabilization Fund Transfers. The Authority may include moneys transferred from the Operating Reserve Fund and the Rate Stabilization Fund as Revenues Available for Bond Debt Service in meeting the Coverage Covenants, subject to certain limitations. See the definition of “Revenues Available for Bond Debt Service,” “Operating Reserve Fund,” and “Rate Stabilization Fund” in Appendix C - “Summary of Certain Provisions of the General Resolution.”

DEBT SERVICE RESERVE FUND

The General Resolution establishes a Debt Service Reserve Fund to be funded in an amount that equals the Debt Service Reserve Fund Requirement. The Debt Service Reserve Fund Requirement is an amount, calculated as of the first day in each Fiscal Year or the date of issuance of a Series of Bonds, equal to the least of (i) 50% of the maximum amount of Adjusted Debt Service due in any succeeding Fiscal Year on all Bonds Outstanding on such date, (ii) 10% of the original net proceeds of such Bonds, (iii) 125% of the average annual Debt Service on such Bonds, or (iv) the maximum amount of Debt Service due on such Bonds in any succeeding Fiscal Year. The Debt Service Reserve Fund Requirement is approximately \$156.6 million. See Appendix C - “Summary of Certain Provisions of the General Resolution.”

Moneys in the Debt Service Reserve Fund are available for the payment of principal of and premium and interest on all Bonds, but not Subordinated Bonds, equally and ratably. See “Financial Operations – Outstanding and

Proposed Indebtedness” for a table setting forth the debt service requirements on the Authority’s Outstanding Bonds and Subordinated Bonds prior to the issuance of the 2019 Bonds. In the event that moneys are withdrawn from the Debt Service Reserve Fund, such withdrawal shall be replenished as nearly as practicable in 12 equal monthly installments commencing in the Fiscal Year following such withdrawal. See Appendix C - “Summary of Certain Provisions of the General Resolution - Flow of Funds from the Revenue Fund.”

OTHER RESERVES

The General Resolution also establishes an Operating Reserve Fund, an Insurance Reserve Fund and a Renewal and Replacement Reserve Fund. The annual requirement for each such reserve is funded in two installments on each December 31 and June 30. Under certain circumstances, moneys on deposit in each of these reserves are available to pay debt service on Secured Bonds. Additionally, other reserves and funds established under the General Resolution are generally available, with certain exceptions, to pay debt service on Secured Bonds in the event Revenues are insufficient. See Appendix C - “Summary of Certain Provisions of the General Resolution - Debt Service Fund,” “- Subordinated Debt Service Fund,” “- Priority of Funds in the Event of Debt Service Fund Shortfall” and “- Priority of Funds in the Event of Subordinated Debt Service Fund Shortfall.”

Operating Reserve Fund. The Operating Reserve Fund is funded from Revenues in the amount of the Operating Reserve Fund Requirement which must be at least one-sixth (1/6th) of the annual Operating Expenses set forth in the Operating Budget. Moneys in the Operating Reserve Fund may be transferred to the Operating Fund for the payment of Operating Expenses upon delivery of a Certificate of an Authorized Representative of the Authority. See Appendix C - “Summary of Certain Provisions of the General Resolution - Operating Reserve Fund.”

Insurance Reserve Fund. The Insurance Reserve Fund is funded from Revenues in the amount of the Insurance Reserve Fund Requirement. Moneys in the Insurance Reserve Fund may be applied by the Authority in the same manner as insurance proceeds, as provided in the General Resolution. See Appendix C - “Summary of Certain Provisions of the General Resolution - Insurance Reserve Fund.”

Renewal and Replacement Reserve Fund. The Renewal and Replacement Reserve Fund is funded from Revenues in the amount of the Renewal and Replacement Reserve Fund Requirement. Moneys in the Renewal and Replacement Reserve Fund shall be applied to fund emergency repairs and replacements and other expenditures for repairs and replacements not provided for in the Operating Budget and the Capital Budget. See Appendix C - “Summary of Certain Provisions of the General Resolution - Renewal and Replacement Reserve Fund.”

The adequacy of each of the Operating Reserve Fund Requirement, the Insurance Reserve Fund Requirement and the Renewal and Replacement Reserve Fund Requirement is reviewed annually by the Authority. The adequacy of Operating Reserve Fund Requirement and the Renewal and Replacement Reserve Fund Requirement also is reviewed every third year by the Consulting Engineer and the adequacy of the Insurance Reserve Fund Requirement is reviewed every third year by the Consulting Engineer or an insurance consultant. The adequacy of the funding requirements have been confirmed for the Insurance Reserve Fund by the Authority’s insurance consultant in a report dated February 2017, and for the Operating Reserve Fund and the Renewal and Replacement Reserve Fund by the Consulting Engineer in its most recent triennial report dated October 2017 with respect to the Systems, prepared and delivered in accordance with the General Resolution.

Appendix C - “Summary of Certain Provisions of the General Resolution.”

OUTSTANDING AND ADDITIONAL INDEBTEDNESS

The Authority has outstanding multiple series of Secured Bonds, aggregating approximately \$5.0 billion, which are secured under the General Resolution on parity with or subordinate to the 2019 Bonds. See “Financial Operations - Outstanding and Proposed Indebtedness.” In addition, the Authority expects to continue to issue Secured Bonds and other indebtedness in the future, pursuant to the provisions of the General Resolution.

The General Resolution contains certain conditions precedent to the issuance of additional Bonds, among them that the Authority shall have met its Primary Bond Coverage Ratio Covenant for the most recent period of 12

consecutive months for which data is available and that the Consulting Engineer shall certify that for the Fiscal Year of issuance and the Fiscal Year thereafter either (i) projected Revenues Available for Bond Debt Service will be sufficient to satisfy the Primary Bond Coverage Ratio Covenant (taking into account the Series of Bonds to be issued and any other Series of Bonds to be issued in such Fiscal Year), or (ii) projected Revenues Available for Bond Debt Service, including only increases in Rates and Charges then approved and including increases in Operating Expenses to the extent required by the General Resolution, will be sufficient to pay debt service on all Bonds (taking into account the Series of Bonds to be issued) and certain required reserve deposits. The foregoing requirements need not be met for Bonds issued to refund other Bonds so long as debt service is not increased in any Fiscal Year and the latest maturity date of Secured Bonds is not extended. The General Resolution requires that upon the issuance of Bonds, for refunding purposes or otherwise, the Debt Service Reserve Fund (which secures Bonds but not Subordinated Bonds) be fully funded to its applicable requirement.

The General Resolution provides certain conditions precedent to the issuance of Subordinated Bonds that are similar to the conditions required in connection with the issuance of additional Bonds.

The General Resolution also permits the Authority to issue other Indebtedness including, but not limited to, revenue, grant and bond anticipation notes, Indebtedness secured by the General Fund and certain non-recourse Indebtedness.

See Appendix C - "Summary of Certain Provisions of the General Resolution - Additional Indebtedness," "- Conditions Precedent to Delivery of a Series of Bonds" and "- Conditions Precedent to Delivery of a Series of Parity or Senior Secured Bonds."

PROPOSED MODIFICATION TO THE GENERAL RESOLUTION

The General Resolution provides that it may be amended by the Authority subject to certain conditions. With certain exceptions, an amendment of the General Resolution requires the consent of the holders of at least two-thirds of the aggregate outstanding principal amount of the Series of Secured Bonds that would be affected by such amendment, measured at the time such amendment becomes effective. Principal exceptions include the following: (i) certain specified amendments may be made by the Authority acting alone or by the Authority with the consent of the Trustee, (ii) no amendment of the General Resolution may permit a reduction of principal or Redemption Price of or a change in the terms of redemption, maturity of principal or resolution of principal or Redemption Price of any Secured Bond, a reduction of the interest rate on any Secured Bond, or a change in the terms of redemption or maturity of principal of any installment of interest on any Secured Bond, in each case without the consent of the holder of such Secured Bond, (iii) no amendment of the General Resolution may reduce the percentages or otherwise affect the classes of Secured Bonds required to consent to modifications to the General Resolution without the consent of the holders of all the Secured Bonds, and (iv) no amendment of the General Resolution may change or modify any of the rights or obligations of the Trustee unless the Trustee assents thereto. For a more complete description of the amendment provisions of the General Resolution, see Appendix C - "Summary of Certain Provisions of the General Resolution - Supplemental Resolutions" and "- Amendments." In addition, certain modifications to the General Resolution may also be subject to consent by other financial institutions, such as credit enhancers and liquidity providers, pursuant to the terms of contracts between such financial institutions and the Authority.

A number of modifications to the General Resolution, which are reflected in the provisions of the General Resolution summarized above and in Appendix C, became effective in April 2015.

One of the modifications that was proposed but that has not yet been effectuated (the “Proposed Amendment”) is the following:

- The general Bondholder consent requirement would be reduced from the holders of two-thirds of the outstanding principal amount of each Series of Secured Bonds affected by a proposed amendment to the holders of 51% of the outstanding principal amount of such Series of Secured Bonds.

The Proposed Amendment will require the consent of the holders of 100% in aggregate principal amount of the Secured Bonds Outstanding at the time the Proposed Amendment becomes effective and compliance with the other provisions of the General Resolution applicable to amendments. As of March 1, 2019, the Authority has obtained consents from holders of 95.4% in aggregate principal amount of Secured Bonds Outstanding. **At the time of issuance of the 2019 Bonds, the Underwriters of the 2019 Bonds will consent and the original purchasers of the 2019 Bonds will be deemed, by their purchase of the 2019 Bonds, to have consented to the Proposed Amendment on behalf of themselves and all subsequent holders of the 2019 Bonds. The Proposed Amendment will apply to the 2019 Bonds only when and if the Proposed Amendment becomes effective upon the consent of the requisite number of holders as described above.** The Authority intends to request that the underwriters or the initial purchasers of each future Series of Secured Bonds issued by the Authority consent to the Proposed Amendment at the time of issuance of each such Series. The subsequent holders of each such Series of Secured Bonds will be deemed to have consented to the Proposed Amendment upon their purchase of such Secured Bonds. For further details of the Proposed Amendment, see Appendix C - “Summary of Certain Provisions of the General Resolution.”

THE AUTHORITY AND ITS SERVICE AREAS

PURPOSES AND POWERS

The Authority was created by the Act, effective January 1, 1985. Pursuant to the Act, the Authority has several main objectives: to construct and maintain sewage treatment facilities which ensure that the Sewer System’s wastewater discharges meet federal and state pollution control requirements; to maintain, operate and improve an adequate water supply distribution system and provide water in conformance with all applicable state and federal regulations; to establish programs for leak detection and reduction of infiltration and inflow within its service areas; to repair, replace, rehabilitate and extend the Systems and to finance the capital and operating expenses arising from their operations on a self-sustaining basis; to provide professional management and Systems-wide planning; and to establish and administer charges on a basis that will foster the conservation of water and improve the quality of the environment.

The Authority owns all personal property constituting the Systems. Real property, including all watersheds, reservoirs and other water rights relating to the Systems (the “DCR Watershed System”), is owned by the Commonwealth and administered by DCR. Under the Act, the Authority has an exclusive right to utilize such quantities of water as may be safely yielded from the DCR Watershed System that are necessary to provide the Authority’s water supply. See “The Systems.”

Under the Act, the Authority may: issue revenue bonds and notes (subject to the debt limitation contained in the Act) (see “Financial Operations - Debt Limitation”); hire personnel and engage consultants and other experts; adopt budgets for its operations and capital improvement programs and establish, after it has held public hearings, rates and charges for its services; expand the service areas of the Waterworks System and the Sewer System subject to certain approvals and other conditions (see “The Systems”); acquire property by purchase, lease or, under certain limitations, eminent domain (other than water and water rights) and lease, sell, transfer or otherwise encumber its property (subject to legal restraints on the disposition of certain public property); and establish rates and charges for its services and commodities without supervision by other agencies of the Commonwealth or any other governmental body and enforce the collection thereof (see “Rates and Charges”).

The Act provides that the Authority’s existence shall continue until terminated by law, provided that no such law shall take effect so long as any bonds or notes of the Authority are outstanding unless adequate provision has been made for the payment or satisfaction of such obligations.

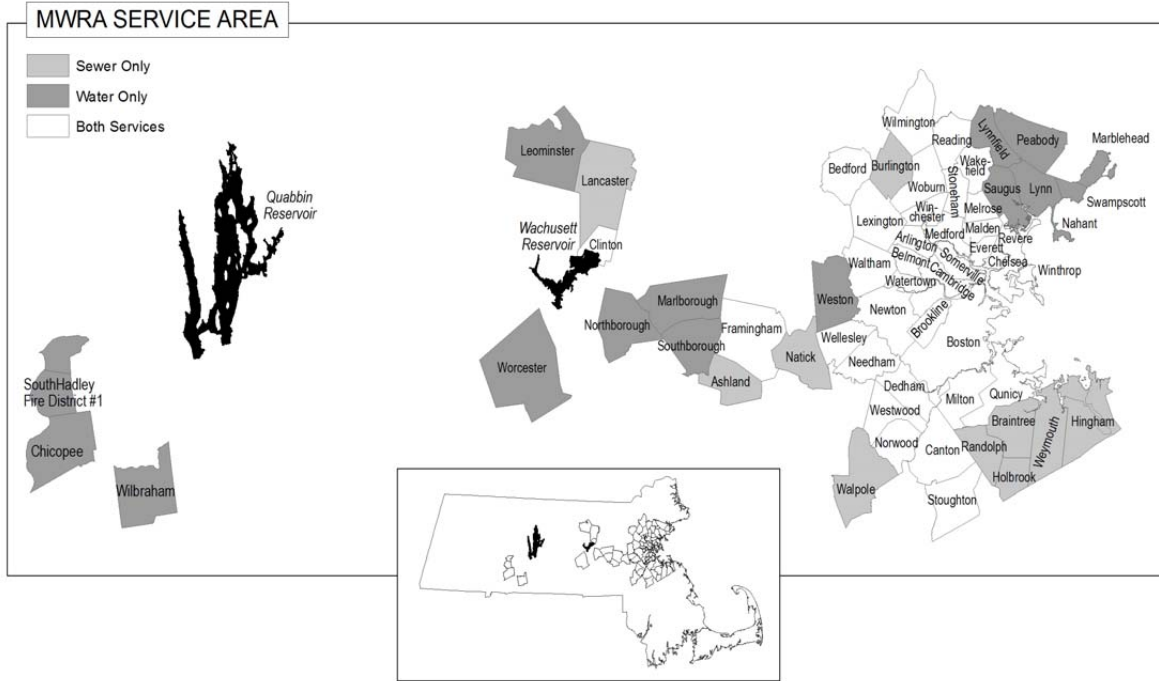
SERVICE AREAS AND MAP

Pursuant to the Act, the Authority is authorized to provide wholesale water and sewer services in service areas encompassing, in whole or in part, 62 communities located primarily in eastern Massachusetts (including the Towns of North Reading and Burlington, which have been authorized pursuant to amendments to the Act to receive water from the Authority once all necessary approvals have been obtained), including most of the cities and towns in the metropolitan Boston area. Approximately 3.0 million people, or approximately 44% of the total population of the Commonwealth, live in the Authority's service areas. Under certain circumstances, the Authority's service areas may be expanded to include additional communities. See "The Systems."

The map on the following page shows the Authority's current service areas for water and sewer services.

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MAP OF THE AUTHORITY'S SERVICE AREAS



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CHARGES TO LOCAL BODIES

The percentage of the Authority’s revenues that has been derived from the rates and charges paid by the Local Bodies for the Authority’s wholesale water and sewer services has varied over time. Over the past 10 fiscal years, more than 90% of the Authority’s revenues have been derived from such rates and charges, and in Fiscal Year 2019, approximately 96.2% of the Authority’s revenues are expected to be derived from such rates and charges. The Local Bodies in turn fund payment of the Authority’s rates and charges from a variety of local sources. The obligation to pay the Authority’s rates and charges is a general obligation of each Local Body, supported by its full faith and credit and payable from all revenue sources. See “Local Bodies.”

The Act originally authorized 46 Local Bodies to be served by the Waterworks System, 32 of which currently derive their entire municipal water supply from the Waterworks System. Eleven currently receive a portion of their water supply from the Waterworks System. Three - Cambridge, Leominster and Worcester - do not generally receive water from the Authority. In addition to those Local Bodies originally authorized by the Act to be served by the Waterworks System, the Authority’s Board of Directors has approved additional members of the Waterworks System - the Towns of Bedford (which receives its water through the Town of Lexington), Stoughton, Reading and Wilmington, and the Dedham-Westwood Water District (which previously had received a portion of its water supply from the Waterworks System). In addition, the Towns of North Reading and Burlington have been authorized to be served by the Waterworks System, once all necessary approvals for each such Town to receive water from the Waterworks System have been obtained. The Authority also is considering the further addition of members to the Waterworks System. See “The Systems - The Waterworks System - Extension and Contraction of Waterworks Service Area.” The allocation among Local Bodies of the Authority’s water charges for each Fiscal Year generally is based upon water consumption in the preceding calendar year. See “Rates and Charges - General.”

The Act authorizes 43 Local Bodies to be served by the Sewer System, all of which currently receive service from the Authority. The Authority also provides wholesale wastewater services to the Town of Clinton and the Lancaster Sewer District through the Clinton Wastewater Treatment Plant. No new communities have become members of the Sewer System. The Authority’s sewer charges are allocated on a proportional basis utilizing, among other factors, total metered flow, contributing population and census population. See “Rates and Charges - General.”

Five Local Bodies, of which the BWSC is the largest, are budgeted to account for approximately 47.4% of the aggregate rates and charges assessed in Fiscal Year 2019 set forth below.

	<u>Percent of Total FY 2019 Authority Water Charges*</u>	<u>Percent of Total FY 2019 Authority Sewer Charges*</u>	<u>Percent of Total FY 2019 Authority Charges*</u>
Boston Water & Sewer Commission	36.3%	28.9%	31.4%
City of Newton	4.8	4.6	4.7
City of Quincy	4.8	4.2	4.4
City of Cambridge	0.0	5.2	3.5
City of Somerville	<u>3.2</u>	<u>3.5</u>	<u>3.4</u>
Total	49.1%	46.4%	47.4%

* Totals may not sum due to rounding.

The following table sets forth the Fiscal Year 2019 charges assessed by the Authority to each Local Body, except charges to certain Local Bodies and certain governmental users with special arrangements with the Authority. See Footnote 1 to the following table and “Local Bodies - Special Arrangements.”

FISCAL YEAR 2019 SYSTEMS CHARGES BY LOCAL BODY¹

<u>Local Body</u>	<u>Systems Charges</u>			Percent of Total FY 2019 Charges
	<u>Water</u>	<u>Sewer</u>	<u>Total</u>	
Arlington	\$ 5,207,787	\$ 8,649,531	\$ 13,857,318	1.88%
Ashland	0	2,693,503	2,693,503	0.36
Bedford ²	0	3,655,178	3,655,178	0.49
Belmont	2,845,415	5,092,015	7,937,430	1.07
Boston Water and Sewer Commission ³	90,752,552	141,531,377	232,283,928	31.43
Braintree	0	9,758,859	9,758,859	1.32
Brookline	7,037,965	12,898,264	19,936,228	2.70
Burlington	0	5,530,776	5,530,776	0.75
Cambridge	0	25,518,527	25,518,527	3.45
Canton	1,874,192	4,383,915	6,258,107	0.85
Chelsea	4,830,322	8,305,015	13,135,338	1.78
Dedham	0	5,597,434	5,597,434	0.76
Dedham-Westwood Water District ⁴	154,204	0	154,204	0.02
Everett	5,466,023	8,876,844	14,342,867	1.94
Framingham	8,205,353	13,423,226	21,628,579	2.93
Hingham Sewer District	0	1,902,184	1,902,184	0.26
Holbrook	0	1,824,554	1,824,554	0.25
Leominster	0	0	0	0.00
Lexington ²	7,128,006	7,572,486	14,700,491	1.99
Lynn Water & Sewer Commission ⁵	320,031	0	320,031	0.04
Lynnfield Water District ⁴	759,983	0	759,983	0.10
Malden	7,119,028	13,514,306	20,633,334	2.79
Marblehead	2,531,598	0	2,531,598	0.34
Marlborough	5,820,947	0	5,820,947	0.79
Medford	6,462,326	12,356,732	18,819,058	2.55
Melrose	2,897,122	6,520,195	9,417,317	1.27
Milton	3,463,069	5,556,575	9,019,644	1.22
Nahant	496,315	0	496,315	0.07
Natick	0	5,972,626	5,972,626	0.81
Needham	856,049	6,173,219	7,029,268	0.95
Newton	12,080,214	22,348,192	34,428,406	4.66
Northborough	1,271,058	0	1,271,058	0.17
Norwood	4,064,489	7,628,062	11,692,551	1.58
Peabody	4,162,771	0	4,162,771	0.56
Quincy	11,998,387	20,708,161	32,706,548	4.43
Randolph	0	6,530,979	6,530,979	0.88
Reading	2,296,922	5,090,525	7,387,448	1.00
Revere	5,185,345	10,761,283	15,946,628	2.16
Saugus	4,016,971	0	4,016,971	0.54
Somerville	8,055,307	17,094,747	25,150,053	3.40
Southborough	866,571	0	866,571	0.12
Stoneham	3,105,808	4,616,825	7,722,633	1.04
Stoughton	161,431	5,072,227	5,233,657	0.71
Swampscott	2,021,785	0	2,021,785	0.27
Wakefield	2,133,553	6,290,285	8,423,837	1.14
Walpole	0	3,988,527	3,988,527	0.54
Waltham	9,311,252	13,800,824	23,112,076	3.13
Watertown	3,696,371	6,357,733	10,054,105	1.36
Wellesley	1,485,700	5,745,909	7,231,609	0.98
Weston	2,493,163	0	2,493,163	0.34
Westwood	0	2,988,061	2,988,061	0.40
Weymouth	0	12,584,755	12,584,755	1.70
Wilmington	503,145	2,913,415	3,416,560	0.46
Winchester	1,840,674	4,319,099	6,159,773	0.83
Winthrop	1,698,840	3,565,533	5,264,373	0.71
Woburn	3,177,148	9,474,524	12,651,672	1.71
Total	<u>\$249,855,191</u>	<u>\$489,187,009</u>	<u>\$739,042,200</u>	<u>100.00%</u>

- ¹ This chart excludes six communities, the revenues received from which are accounted for by the Authority as other charges for services, rather than as rates and charges. These excluded communities include four of the 24 communities that currently receive water pursuant to contracts: Chicopee, South Hadley (served by South Hadley Fire District No. 1), and Wilbraham (collectively, the “CVA Communities”) and Worcester. Worcester currently only receives water services on an emergency basis. The fifth excluded community is Clinton, which receives its first 800 million gallons of water per year at no charge pursuant to a special act, and typically consumes less than 800 million gallons annually, but would be charged generally applicable rates for any amounts in excess thereof. Clinton also receives wastewater services provided by the Clinton Wastewater Treatment Plant and charges for this service are excluded from this chart. The sixth excluded community, Lancaster (served by the Lancaster Sewer District), receives wastewater services provided by the Clinton Wastewater Treatment Plant. The six excluded communities are budgeted to account for approximately \$6.1 million in Authority revenues for Fiscal Year 2019. The chart also excludes Leominster, which, although named in the Act to be served by the Waterworks System, has taken no water from the Authority since January 1991, and North Reading, which was authorized through an amendment to the Act to receive water from the Authority, but to which services have not yet commenced. Burlington, originally named in the Act to receive wastewater services only, has been authorized pursuant to an amendment to the Act to receive water services; such services have not yet commenced.
- ² Water services to Bedford are provided through Lexington, pursuant to an inter-municipal agreement between the towns; the Authority does not separately meter Bedford’s water usage and the charges for Bedford’s water usage are billed to Lexington.
- ³ The Authority’s services to the City of Boston are provided through and assessed to the BWSC. The BWSC is a body politic and corporate and independent political subdivision of the Commonwealth. The City of Boston is not liable for the rates and charges imposed on the BWSC by the Authority.
- ⁴ The Authority provides water services to a portion of the population of Lynnfield through the Lynnfield Water District, a body corporate of the Commonwealth, and to the Towns of Dedham and Westwood through the Dedham-Westwood Water District, a body politic and corporate of the Commonwealth. The Town of Lynnfield and the Towns of Dedham and Westwood are not liable for the rates and charges imposed by the Authority on the Lynnfield Water District and the Dedham-Westwood Water District, respectively.
- ⁵ The Authority’s services to a single large industrial user in Lynn are provided through and assessed to the Lynn Water and Sewer Commission (the “LWSC”). The LWSC provides service to the rest of Lynn from its own resources without obtaining service from the Authority. The LWSC is a body politic and corporate and independent political subdivision of the Commonwealth. Neither the City of Lynn nor the retail industrial user is liable for the rates and charges imposed on the LWSC by the Authority.

Subject to applicable federal and state regulations and certain regulatory powers of the Authority, Local Bodies continue to exercise control over their respective retail water distribution and wastewater collection systems. Except in an emergency, written notice of any proposed local rules and regulations regarding use of the retail systems must be furnished to the Authority prior to adoption. Regulatory powers for monitoring and regulating Local Bodies conferred by the Act upon the Authority relate to matters such as water conservation and development of local water supply sources, implementation of federal and state toxic waste and pretreatment laws, reduction of infiltration and inflow of ground and surface waters into the Sewer System, and installation of water meters. See “The Systems.”

By state legislative action or with the Authority’s approval, Local Bodies currently served by the Authority could seek to develop alternative water or wastewater delivery systems, although such systems would need to comply with all applicable federal and state environmental standards. The Authority believes that such alternatives are likely to be prohibitive in cost for most of the Local Bodies and, particularly in the case of alternative sewage treatment facilities, would take many years to implement.

RATES AND CHARGES

GENERAL

For Fiscal Year 2019, approximately 96.2% of the Authority’s budgeted revenues are expected to be derived from wholesale rates and charges assessed to the Local Bodies. The remaining revenues are expected to be derived primarily from investment income and miscellaneous income, including assessments to certain Local Bodies not included as rates and charges. The Act requires that the Authority set its rates and charges at levels sufficient to pay, among other things, its current expenses and its debt service, and to provide the debt service coverage required by the General Resolution. See “Security for the 2019 Bonds - Coverage Covenants.”

In accordance with the Act, the Authority’s rate setting is exercised independently by its Board of Directors without being subject to the approval of any department, agency or other instrumentality of the Commonwealth or

any other governmental body. The Authority's rates and charges are adopted annually in June after notice and public hearing, and review of non-binding recommendations by the Authority's Advisory Board. The level of the Authority's rates and charges assessed to Local Bodies is not subject to the limitations set forth in Proposition 2½. For a discussion of the effect of Proposition 2½ on the ability of Municipal Local Bodies to raise revenues to pay assessed rates and charges through property tax levies, see "Local Bodies - Municipal Sources of Revenue."

The Authority's charges for services are billed directly to Local Bodies on a wholesale basis. The Authority currently notifies each Local Body of its annual charges on or about July 1 of each year. To assist Local Bodies with their respective annual budget or rate-setting processes, the Authority furnishes them with preliminary estimates of their respective rates and charges for the following Fiscal Year in February of each year. Authority charges are payable in 10 equal installments due on or before the first business day of each month, excluding January and July, of each Fiscal Year. There is an interest charge of 1% per month for late payments.

As required by the Act, the Authority establishes charges of general application separately for the services provided by the Waterworks System and the Sewer System. In setting water rates, the Authority first identifies through its budgeting process the total amount of revenue that must be raised through water rates in a given Fiscal Year, net of other anticipated sources of revenue, such as investment income, receipts from water supply contracts and other special arrangements. Generally, charges for water services are computed by the Authority on the basis of the proportional metered water use of each Local Body for the immediately preceding calendar year. Accordingly, with certain exceptions, the Fiscal Year 2019 water charges are based on the Local Bodies' metered water use in calendar year 2017.

Sewer charges are computed on a proportional allocation basis utilizing, among other things, total flow, contributing population and census population for each Local Body. Consistent with the initial step in setting water rates, the Authority first determines the total amount of revenue required to be raised from sewer charges. The total amount of required revenue for the Sewer System is allocated either to operating costs or capital costs. Operating costs are allocated to each Local Body based on the average of the prior three calendar years' total flow, with adjustments for strength of flow to take into account above-average concentrations of total suspended solids and biochemical oxygen demand. Capital costs, including debt service, are allocated to each Local Body based on a combination of (i) the average of the prior three years' peak month wastewater flow and average concentrations of total suspended solids and biochemical oxygen demand, (ii) the proportion of the population of the Local Body that is served by the local sewer system (the "contributing population") to the total contributing population in the Sewer System, and (iii) the proportion of the Local Body's U.S. census population, based upon the Commonwealth's most recent bi-annual update (the "census population"), to the total census population in the Sewer System.

Beginning in Fiscal Year 2017, the Authority implemented a rate smoothing mechanism that allows the rate revenue requirement related to capital financing expenses to be smoothed between the charges for the Waterworks System and the Sewer System, mitigating annual volatility. This approach allows for more certain predictability by the Local Bodies of rate increases.

HISTORICAL RATES AND CHARGES

The Authority's rates and charges have increased at an average annual rate of approximately 3.3% for the period from Fiscal Year 2015 through Fiscal Year 2019. Since the Authority's inception, in all but one instance, the Authority has collected from the Local Bodies 100% of its rates and charges within 30 days of their due dates. The following table sets forth the aggregate budgeted charges of the Authority from Fiscal Year 2015 through Fiscal Year 2019, and the percentage change from the prior Fiscal Year.

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**HISTORICAL RATE REVENUE
AND PERCENTAGE INCREASES¹**
(dollar amounts in millions)

Fiscal Year	Water		Sewer		Combined	
	Amount	Increase	Amount	Increase	Amount	Increase
2015	\$210.2	--	\$440.1	--	\$650.3	--
2016	226.4	7.7%	446.1	1.4%	672.4	3.4%
2017	234.3	3.5	460.6	3.3	694.9	3.3
2018	242.4	3.5	474.6	3.0	717.1	3.2
2019	249.9	3.1	489.2	3.1	739.0	3.1

¹ Does not include revenues received by the Authority from Local Bodies pursuant to contracts or special acts that are accounted for as other charges for service rather than as rates and charges.

The costs of the CIP projects primarily have been funded through the proceeds of long-term indebtedness, including such major projects as the Boston Harbor Project, the MetroWest Water Supply Tunnel, and the John J. Carroll Water Treatment Plant. As a result, the debt service on such indebtedness is a significant portion of the Authority’s Current Expense Budget (“CEB”). Approximately 62.8% of total expenses included in the Fiscal Year 2019 Current Expense Budget (the “FY19 CEB”) is for capital financing expenses. In recent years, the Authority has managed rate increases through the use of commercial paper, refinancing existing debt at lower interest rates, the use of revenues to defease debt, undertaking additional borrowing at subsidized interest rates from the Massachusetts Clean Water Trust (the “Trust”), and various efficiency and cost control strategies. From Fiscal Year 2006 to date in Fiscal Year 2019, the Authority has defeased more than \$587.7 million of Secured Bond debt service. The Authority’s efforts have resulted in mitigating rate increases to date and in leveling out anticipated rate increases due to increasing debt service costs. Nonetheless, the Authority’s rates and charges will continue to increase as the Authority’s operating expenses increase and as the Authority continues to undertake capital improvements to upgrade and maintain the Systems. See “Future Rates and Charges” below.

The Authority is eligible to receive funding from the Commonwealth’s Sewer Rate Relief Fund (the “Fund”), in the form of debt service assistance, in order to mitigate increases in rates. The amount of such debt service assistance is subject to annual appropriation by the Commonwealth and varies annually. In recent fiscal years, the Commonwealth has reduced or eliminated appropriations to the Fund. Accordingly, for planning purposes, in preparing the FY19 CEB, the Authority assumed that it would not receive any additional debt service assistance in Fiscal Year 2019 and in future years. The Authority actually received approximately \$0.9 million of debt service assistance in Fiscal Year 2018 that was applied in the FY19 CEB to reduce Fiscal Year 2019 rates and charges. The Authority cannot predict the amount, if any, of additional debt service assistance that will be appropriated in future years.

FUTURE RATES AND CHARGES

While the Authority expects to continue to seek and adopt measures to moderate its future rate increases, the Authority’s rates and charges are expected to continue to increase to meet the increased debt service costs necessary to finance the projects included in the CIP, and to fund increased operating expenses resulting from the operation of the Systems.

The table below sets forth the Authority’s estimates of its future rate revenue requirements for Fiscal Years 2019 through 2023, based on the FY19 CEB and the FY19 CIP and assumes that the Authority will not receive additional debt service assistance during the projection period. The estimates assume an inflation rate of 2.5% for capital projects that are not yet under contract, and that annual capital expenditures will be made in accordance with the FY19 CIP and will be capped at \$160 million for Fiscal Year 2030 and thereafter. The Authority’s estimates, based on the FY19 CIP, assume the issuance of approximately \$870 million of additional Secured Bonds from Fiscal Year 2019 through Fiscal Year 2023 to finance the FY19 CIP, and approximately \$81 million in pay-as-you-go capital expenditures during the same period. The estimates assume that the Authority’s future long-term bond financings will consist of 25-year debt in Fiscal Years 2019 and 2020 and 30-year debt in Fiscal Year 2021 and

thereafter. Long-term debt is assumed to bear fixed rates of interest of 5.25% in Fiscal Years 2019 and 2020, 5.5% in Fiscal Year 2021, 5.75% in Fiscal Year 2022, and 6.0% thereafter. Variable rate indebtedness of the Authority is assumed to bear interest at 3.5% in Fiscal Year 2019, 3.75% in Fiscal Year 2020, 4.0% in Fiscal Year 2021, and 4.22% thereafter. Loans from the Trust are assumed to bear interest at an effective rate of 2.2% with a 20-year term. Operating expenses (other than labor costs) are inflated at 3.0% annually; labor costs are inflated at 2.7% annually. The Authority believes that the estimates are based upon realistic cost estimates and other assumptions, and include adequate provision for contingencies. See “Historical Rates and Charges,” above, and “Management’s Review of Operating Results - Fiscal Year 2018 Current Expense Budget and Third Quarter Results,” below. However, as discussed below, there can be no assurance that actual revenue requirements or expenditures will not vary from current estimates and cause actual rates and charges to be different from current estimates. For a discussion of risk factors that could lead to higher costs in the CIP, see “Capital Improvement Program - Factors Affecting the Capital Projects.” See also, Appendix B - “April 2019 Report of the Consulting Engineer - Section 4 Rate Revenue Requirement and Retail Customer Impacts,” which includes rate projections based on the proposed CEB and CIP for Fiscal Year 2020 for the period Fiscal Year 2020 through Fiscal Year 2024.

**ESTIMATED FUTURE RATE REVENUE REQUIREMENTS
AND PERCENTAGE INCREASES**
(dollar amounts in millions)

<u>Fiscal Year</u>	<u>Rate Revenue</u>	<u>Percentage Increase</u>
2019	\$739.0	--
2020	766.7	3.7%
2021	795.3	3.7
2022	824.3	3.6
2023	842.8	2.3

Actual retail rate increases of specific Local Bodies vary considerably because of different practices among Local Bodies in the extent to which the Authority’s rates and charges are incorporated into retail user charges and the disparity in levels of the local water and sewer costs of the Local Bodies. Based upon the most recent survey conducted by the Authority’s Advisory Board of Local Bodies’ rates and charges (the “2018 Survey”), which reflects the Local Bodies’ charges for calendar year 2017, and assuming annual household water usage of 90,000 gallons, the 2018 Survey estimates that the annual average household combined water and sewer bill in those Local Bodies that receive full water and sewer services from the Authority is approximately \$1,602. Actual annual bills vary from this average, in part due to the fact that there are certain Local Bodies that in the past raised their own retail rates at paces different from the Authority’s rate increases and to the fact that actual annual household usage in many Local Bodies is less than 90,000 gallons. See Appendix B - “April 2019 Report of the Consulting Engineer - Section 4.3 Retail Customer Impacts.”

The Local Bodies fund their payment of the Authority’s rates and charges in a variety of ways, so that it is difficult to generalize about the effect of the Authority’s future rate increases on retail ratepayers, including households and businesses in the service area. Provision for and payment of increasing rates and charges will depend on a number of factors, including the Local Bodies’ methods of funding Authority charges and the availability of local sources of revenue.

From time to time, public concern is expressed regarding the increasing level of the Authority’s rates and charges. The Authority believes that public awareness of several factors will continue to mitigate public opposition. These factors include: (i) the federal and state legal and regulatory mandates (including legal enforcement orders issued by courts or administrative agencies) to which the Authority is subject, (ii) the importance of improvements to the Systems to support future regional economic growth, (iii) public support for meeting environmental protection and public health goals, and (iv) the Authority’s success in mitigating rate increases in the past, including average annual increases of approximately 3.3% in Fiscal Years 2015 through 2019.

The Authority believes that the considerations described above contributed to the Authority receiving substantial financial assistance, from both the federal and state governments, to help finance the CIP. This financial

assistance - in the form of capital grants, loans from the Trust at subsidized interest rates, and debt service assistance - helped in the past to mitigate rate increases. The Authority will continue to pursue financial assistance for its programs through legislative and other avenues to help mitigate future rate increases, however, there can be no assurance as to the receipt or continuation of state or federal support.

ENFORCEMENT

The Authority has adopted, and is authorized by the Act to enforce, billing and collection procedures and regulations, including requirements for the submission to the Authority of relevant information regarding the provision of retail services by Local Bodies. In the event any charge to a Local Body is not paid when due, the Act authorizes the Authority to recover the amount due, together with interest and other actual damages, by action in the state superior court.

Without suit, the Authority may use an intercept mechanism (the “local aid intercept”) established by the Act to recover amounts unpaid by a Local Body. To trigger this mechanism, the Authority must certify to the State Treasurer the amount of any unpaid charge, whereupon the State Treasurer is required by the Act to deduct such unpaid charge from all amounts payable to the Local Body by the Commonwealth, if any, regardless of their intended use (including state reimbursements, grants and general local aid funds) and to pay such amount over to the Authority. For a description of general local aid funds as a source of revenue available to Local Bodies to pay Authority charges, see “Local Bodies - Municipal Sources of Revenue.” The Authority has covenanted in the General Resolution to use this enforcement mechanism in the event that a Local Body fails to make timely payment. Although the Authority successfully has used the local aid intercept in the past, the Authority has not needed to use the local aid intercept in more than 25 years.

Distributions of local aid payable to the municipalities served by Special Purpose Local Bodies, including the BWSC, would not be available to meet unpaid charges due the Authority through the local aid intercept. Municipalities served by such Special Purpose Local Bodies account for approximately 31.6% of the Authority’s combined rates and charges assessed for Fiscal Year 2019.

Under the laws of the Commonwealth, there are currently several other similar local aid intercept mechanisms that may affect the amounts available for intercept on behalf of the Authority. The State Treasurer is authorized to deduct from a Local Body’s local aid distributions amounts owed by such Local Body to the Commonwealth for certain assessments and charge-backs. In addition, under the so-called Qualified Bond Act, cities and towns in the Commonwealth, including certain Local Bodies, may secure their bonds and notes by authorizing the State Treasurer to intercept from their respective local aid distributions the amount necessary to pay principal and interest on such debt. Under state law, the amounts available for intercept on behalf of the Authority also may be affected by actions taken by or on behalf of the Massachusetts Department of Revenue, the Massachusetts School Building Authority, and the Massachusetts Bay Transportation Authority, among others, with respect to amounts owed to or by a Local Body. Finally, under the Commonwealth legislation establishing the Trust, the State Treasurer may, under certain circumstances, deduct from a community’s local aid distribution (i) the amount of charges owed by the community to the Trust, (ii) the amount of charges owed by the community to any entity that provides wastewater or drinking water service to the community and has a repayment obligation to the Trust (a “Regional Unit”) that the Regional Unit has not fulfilled by reason of the default of such community in its payment obligations to the Regional Unit, and (iii) the community’s pro rata share of any payment obligation of a Regional Unit to the Trust that has not been fulfilled but not due to the default of any particular community or communities served by the Regional Unit. Since the Authority is a Regional Unit under the Trust’s enabling act, failure by the Authority to pay debt service on its loans from the Trust would permit the Trust to exercise its intercept against the Local Bodies. As of March 1, 2019, the Authority had outstanding approximately \$979.9 million in aggregate principal amount of loans from the Trust. The Trust also has made loans to or purchased local governmental obligations from 44 Local Bodies, including the BWSC, in an approximate aggregate principal amount of \$567.7 million outstanding as of March 1, 2019, the debt service on which also is subject to intercept.

In addition to the possibility of a Municipal Local Body's local aid being accessed by another offset mechanism prior to the Authority's attempt to intercept it, the availability of local aid in the future to satisfy unpaid charges imposed by the Authority will be dependent upon, among other things, the aggregate amount actually appropriated by the state Legislature and distributed by the Governor in a fiscal year. For a discussion of these and other factors affecting local aid, see "Local Bodies - Municipal Sources of Revenue."

OTHER SOURCES OF REVENUE

The Authority receives revenues from other sources, including water supply contracts and other arrangements between the Authority and certain Local Bodies under which amounts paid to the Authority are not accounted for by the Authority as assessed rates and charges (although such contract revenues are included in the definition of Rates and Charges for purposes of the General Resolution). Such revenue is budgeted to be approximately \$9.3 million in Fiscal Year 2019. See "Local Bodies - Special Arrangements." The Authority also receives investment earnings on various funds that it holds, which are budgeted to total approximately \$13.6 million in Fiscal Year 2019. Revenues from permits, fines, fees and other miscellaneous sources are budgeted to total approximately \$6.0 million in Fiscal Year 2019.

LOCAL BODIES

GENERAL

The Authority provides services to Local Bodies on a wholesale basis. The obligation of the Local Bodies to pay for these services is a general obligation payable from any and all sources of revenue available to the Local Bodies. The legal structure of a Local Body determines which revenue sources are available to it under state law. The revenues available to Special Purpose Local Bodies, each a retail system operator, are limited primarily to retail user fees and charges and investment income. Such entities have no taxing power and do not ordinarily receive distributions of local aid. Revenues of Municipal Local Bodies used to pay the Authority's rates and charges are derived primarily from retail user charges, property taxes, and local aid. All Municipal Local Bodies have instituted retail user charges, although there are substantial differences in the proportion of its full costs that each Municipal Local Body recovers through its retail user charges.

BOSTON WATER AND SEWER COMMISSION

The BWSC is budgeted to account for approximately 31.4% of the Authority's combined rates and charges assessed for Fiscal Year 2019. Established in 1977 as a public instrumentality, a body politic and corporate and a political subdivision of the Commonwealth, the BWSC is responsible for the retail operation of the water distribution and wastewater collection and storm water drainage systems of the City of Boston (the "City") and for the maintenance and improvement of such systems. The BWSC purchases its water in bulk from the Authority. Such water is delivered through 29 active metered connections located at various points throughout the BWSC's water distribution system. The BWSC's sewer system transports the City's wastewater to the Authority's interceptor sewers, which convey the wastewater to the Deer Island Treatment Plant for treatment and disposal.

The Authority's charges to the BWSC constitute general obligations of the BWSC. The BWSC has no taxing power but funds its operations through the collection of user fees and charges. Chapter 436 of the Acts of 1977 of the Commonwealth (the "BWSC Act") requires the BWSC to establish its rates and charges at levels sufficient to (i) pay the current expenses of the BWSC (including the Authority's rates and charges), (ii) pay all BWSC debt service, (iii) create and maintain reasonable reserves required by any bond resolution, (iv) provide funds for paying the cost of all necessary repairs, replacements and renewals of the BWSC's systems, and (v) pay or provide for any and all amounts that the BWSC may be obligated to pay or provide for by law or contract. The BWSC's rates and charges are independently set by the BWSC and are not subject to regulation or approval by any other governmental body. However, the BWSC is required to give written notice to the Authority of its proposed rules and regulations, including its rates, relating to its water and sewer services prior to adoption.

The BWSC serves approximately 90,000 accounts. Its 20 largest users as of December 31, 2018 (the end of its most recent fiscal year) are estimated to have accounted for approximately 19% of the BWSC's aggregate retail

user charges in its fiscal year 2018. Its customers include many large commercial entities, governmental agencies and not-for-profit institutions including its five largest customers: the Boston Housing Authority, the Massachusetts Port Authority, Boston University, Medical Area Total Energy, and Partners HealthCare System. The BWSC has realized surpluses from its operations in each year since its inception.

As of December 31, 2018, the BWSC had approximately \$541.0 million aggregate principal amount of revenue bonds outstanding. The BWSC has granted a security interest in its revenues as security for its revenue bonds. The BWSC's bond resolutions also provide that debt service on the BWSC's revenue bonds and operating expenses of the BWSC shall be paid prior to the Authority's rates and charges. As of December 31, 2018, the BWSC had combined loans/grants from the Authority outstanding in the amount of \$36.8 million.

The single largest component of the BWSC's expenses has been assessments to the BWSC by the Authority. Authority assessments for the costs of water supply and wastewater treatment services provided to the BWSC have continued and, based on BWSC projections, will continue to increase as a percentage of the BWSC's total expenses. The BWSC estimates that the Authority's assessments to the BWSC will be 61.3% of the total costs of operation of the BWSC in calendar year 2019.

MUNICIPAL SOURCES OF REVENUE

General. Cities and towns in the Commonwealth are limited by state law as to the types of revenues that they can raise to support local spending, including for the rates and charges of the Authority. Under current state law, the Municipal Local Bodies may derive their revenues from several sources, including water and sewer user charges, property taxes, local aid distributions, certain excise receipts (including motor vehicle excises and local option excises), departmental revenues (including parking fines and building permit fees), and investment income. Some of the revenue sources discussed in this subsection are not available to Special Purpose Local Bodies, including the BWSC.

User Fees and Charges. Each Municipal Local Body owns and operates a distribution system of pipes for water and a collection system for sewage. Each Municipal Local Body is authorized by state law to charge just and equitable retail user charges to cover the respective costs of providing these municipal services, including operation and maintenance of the Municipal Local Body's system, replacement of capital components of the system over time, and the Authority's annual charges to such Municipal Local Body. These retail user charges are not subject to the limitations of Proposition 2½. Under the Act, Local Bodies may establish rates and charges for retail services on a flat rate basis or on an ascending unit rate based on quantity, and may permit adjustments in their local rates for the age, infirmity or poverty of their retail customers.

The Act also permits the Authority, subject to federal and state constitutional restrictions on the impairment of contracts in effect on the effective date of the Act, to require Local Bodies to adopt systems of rates and charges that comply with applicable federal and state law and with Authority policies designed to promote water conservation, full local cost recovery, the elimination of infiltration and inflow of ground and surface waters, and the pretreatment of industrial wastes.

The revenues received by a Municipal Local Body through its retail user charges are not pledged to the payment of any costs of the local systems, including the payment of the rates and charges of the Authority. A Municipal Local Body may elect, however, to segregate such retail user charges and apply them only to the costs of the respective local systems.

Enforcement remedies are available under state law to Municipal Local Bodies to collect unpaid retail user charges. A Municipal Local Body may terminate water and sewer service to any retail user who has not paid the respective charges. In addition, if a Municipal Local Body accepts the applicable statutory sections, unpaid water and sewer charges become a lien upon the associated real estate by operation of law and are added to the property tax bill for such real estate. In general, the laws relating to the imposition of interest on unpaid real estate taxes and the foreclosure of title to real estate for nonpayment of taxes apply equally to unpaid water and sewer charges.

Among the Municipal Local Bodies, different local policies, including each Municipal Local Body's decision about the extent to which the costs of operating its local system are recovered through its retail rates, and the complexity of its rate structure and its accounting methodologies, result in divergent retail user charges. Currently, while all Municipal Local Bodies have instituted retail user charges, certain Municipal Local Bodies may not recover the entire cost of providing retail services through user charges. The Authority is able to offer technical assistance to the Municipal Local Bodies to help them establish systems of retail user charges and identify costs that can be recovered through such charges.

Property Taxes. Property taxes are raised through assessments against real and personal property in a municipality. State law mandates a revaluation of all taxable property every three years. These revaluations are reviewed and certified by the Commonwealth. In the years between the revaluations, the Commonwealth permits municipalities to establish new values for year-to-year increases in assessments on the basis of market trends, using the most recent revaluation as a basis. These new values, together with the municipalities' proposed tax rates, are subject to annual certification by the Commonwealth. The property tax levy generally is certified by the Commonwealth in the fall. Most municipalities adopt a quarterly payment schedule for property taxes, with installments due on August 1, November 1, February 1 and May 1.

Proposition 2½ generally constrains levels of property taxation, one of the primary sources of revenue for cities and towns in the Commonwealth, and limits the charges and fees imposed on cities and towns by certain governmental entities. The law is not a constitutional provision and accordingly is subject to amendment or repeal by the state Legislature. Proposition 2½ contains limitations on the revenues that may be collected by certain governmental entities, including a limitation on the property taxes that may be levied by any city or town in any fiscal year to the lesser of (i) 2.5% of the full and fair cash valuation of the real estate and personal property therein, and (ii) 2.5% over the previous year's levy limit plus any growth in the tax base from certain new construction and parcel subdivisions. Proposition 2½ also limits any increase in the charges and fees assessed by certain governmental entities on cities and towns to the sum of (i) 2.5% of the total charges and fees imposed in the preceding fiscal year, and (ii) any increase in charges for services customarily provided locally or services obtained by the city or town at its option.

Any property tax increase in excess of the limits imposed by Proposition 2½ must be approved by a vote of the municipality. However, amendments to Proposition 2½ enacted in 1994 permit a Municipal Local Body, and a Special Purpose Local Body through agreement with the municipalities it serves, to offset increases in user charges resulting from increases in water and sewer debt service costs (including increases in the Authority's debt service costs incorporated into the Authority's rates and charges to such Local Body) through the assessment of property taxes in excess of the limits imposed by Proposition 2½, subject to certain conditions, without requiring a vote of the municipality.

Local Aid. Local aid is the generic term used to describe all distributions made by the Commonwealth to cities and towns. Certain local aid distributions are earmarked for specific programs, *e.g.*, a large portion of local aid has been earmarked for public education, but the bulk of such distributions are available to the municipality to be applied to any authorized expenditures. Except for amounts distributed to municipalities pursuant to state law from state lottery receipts, all local aid is subject to annual appropriation by the state Legislature. The major formula used by the state Legislature in determining the payment level to each city and town tends to provide proportionately more local aid to communities with relatively lower per capita income and with higher service cost levels in order to compensate for the gap between certain fixed costs incurred by a municipality and its revenue-raising capacity. The bulk of the local aid distributions are, by state law, made quarterly. From time to time legislation and voter initiative petitions are approved that affect the amount of local aid to be distributed by the Commonwealth.

Under the Massachusetts Constitution and state finance law, the State Treasurer and the Governor have the authority to withhold or delay local aid payments under certain circumstances. Any available moneys in the state treasury, including amounts appropriated for local aid, may be used as a matter of last resort by the State Treasurer if required to pay Commonwealth notes. Moreover, the statute governing the Commonwealth's distribution of school aid (which constitutes a portion of the local aid distribution) provides that such payments are due only to the extent that sufficient funds are available therefor.

The amount of local aid distributions varies, based on the Commonwealth's budget constraints, and there can be no assurance that local aid will not be reduced in the future. However, the Authority believes that the availability of its various enforcement mechanisms, including its statutory authority to intercept local aid distributions, will adequately provide for the payment of its rates and charges. For a comparison of the Authority's rates and charges with respect to each Municipal Local Body, see "The Authority and Its Service Areas" and "Charges to Local Bodies." For a discussion of the Authority's enforcement mechanisms and the possible limits on the availability of the local aid intercept, see "Rates and Charges – Enforcement."

SPECIAL ARRANGEMENTS

Twenty-five Local Bodies currently are charged for water services pursuant to contracts between the Local Bodies and the Authority or by special legislative acts. Of these Local Bodies, 20 pay for water services at the full water rates. Various arrangements are in effect for five Local Bodies, which in the aggregate account for approximately 4.5% of total consumption in Fiscal Year 2019. The three CVA Communities have a separate assessment. Southborough receives its first 150 million gallons per year at no charge. Clinton receives its first 800 million gallons of water per year at no charge pursuant to a special act, and typically consumes less than 800 million gallons annually, but would be charged generally applicable rates for any amounts in excess thereof.

Pursuant to Authority regulations, continuation of water supply services to any Local Body under special acts or contracts shall be made on such reasonable terms and charges as the Authority shall determine, provided in each instance the Authority determines that (i) the safe yield of the DCR Watershed System, on advice of the DCR Division of Water Supply Protection, is sufficient to meet the projected demand (provided that any Local Body previously receiving water supply services on a contract basis shall not be denied continuation of service if it has no other local water supply capable of being developed), (ii) no existing or potential local water supply has been abandoned, (iii) the Local Body has adopted a water management plan approved by the state Water Resources Commission, (iv) the Local Body has adopted effective demand management, leak detection and water system rehabilitation measures, (v) a local water source feasible for development has not been identified by the Local Body or the Massachusetts Department of Environmental Protection ("DEP"), and (vi) a water use survey has been completed identifying all local users in the Local Body consuming in excess of 20 million gallons per year.

The provision of sewer services by the Sewer System, in contrast to the special acts and contractual arrangements governing a portion of the services provided by the Waterworks System, is governed solely by the Act and other applicable federal and state environmental quality laws and regulations.

MANAGEMENT AND ORGANIZATION OF THE AUTHORITY

BOARD MEMBERSHIP

The Authority is governed by an 11-member Board of Directors (the "Board") chaired by the Secretary of Energy and Environmental Affairs for the Commonwealth. The Secretary and two other members are appointed by the Governor – one resident of a Connecticut River basin community and one resident of a Merrimack River basin community who represent water resources protection interests (terms coterminous with the Governor). At least one of the three gubernatorial appointments must be a representative of a minority group. One member is appointed by the Mayor of Quincy (term coterminous with the Mayor) and one member is appointed by the Winthrop Town Council by majority vote (four-year term). Three members of the Board are appointed by the Mayor of Boston (terms coterminous with the Mayor), and three are appointed by the Advisory Board (staggered three-year terms). See "Advisory Board" below. Six members of the Board constitute a quorum, and the affirmative vote of six members is required to approve any matter put to a vote of the Board. A member of the Board continues to serve until a successor is appointed.

The present members of the Board, their occupations, appointment categories, the dates of their original appointment and the dates of expiration of their terms as members of the Board are set forth on the following table.

BOARD OF DIRECTORS

<u>Member</u>	<u>Occupation</u>	<u>Date and Source of Original Appointment</u>	<u>Current Term Expires</u>
Kathleen A. Theoharides, <i>Chair</i>	Secretary of Energy and Environmental Affairs <i>Ex Officio</i>	May 3, 2019	Coterminous with term as Secretary
John J. Carroll, <i>Vice Chair</i>	General Manager, Town of Norwood (Retired)	February 27, 1985; Advisory Board	June 30, 2020
Andrew M. Pappastergion, <i>Secretary</i>	Commissioner, Department of Public Works, Town of Brookline	June 25, 1997; Advisory Board	June 30, 2021
Christopher Cook	Chief of Environment, Energy and Open Space, City of Boston	January 14, 2019; Mayor of Boston	Coterminous with Mayor
Kevin L. Cotter	Business Manager/Treasurer, Plumbers and Gasfitters Local 12 (Retired)	September 3, 2002; Mayor of Boston	Coterminous with Mayor
Paul E. Flanagan	Fire Chief, Town of Winthrop	October 15, 2012; Winthrop Town Council	February 15, 2023
Joseph C. Foti	Deputy Administrator and Chief of Operations and Maintenance, MassDOT Highway Division	June 21, 2001; Advisory Board	June 30, 2019
Brian Peña	Commissioner, Water and Sewer Department, City of Lawrence	June 22, 2015; Governor	Coterminous with Governor
Henry F. Vitale	Executive Director, Boston Water and Sewer Commission	January 15, 2013; Mayor of Boston	Coterminous with Mayor
John J. Walsh	Manufacturing Engineer (Retired)	June 3, 2009; Mayor of Quincy	Coterminous with Mayor
Jennifer L. Wolowicz	Assistant Town Administrator, Town of South Hadley	March 18, 2013; Governor	Coterminous with Governor

ORGANIZATION, MANAGEMENT AND STAFF

The staff of the Authority is headed by an Executive Director who is responsible for the implementation of Authority programs, policies and procedures at the direction of the Board. There are four divisions and several departments that report directly to the Executive Director, including the Affirmative Action Compliance Unit, the Internal Audit Department, Public Affairs, and the Tunnel Redundancy Program..

The Chief Operating Officer heads the Operations Division. Although the Operations Division provides some services on a consolidated basis to more efficiently support both the Waterworks System and the Sewer System, the costs for providing water and sewer services are separately tracked in order to comply with the Act.

The Authority has established the Tunnel Redundancy Program to manage and direct the design, construction, engineering and procurement activities for the Tunnel Redundancy Project through a Director and staff dedicated to the project. See “Capital Improvement Program - Capital Projects In FY19 CIP - Waterworks Projects - Transmission System.”

The Finance Division, headed by the Director of Finance, comprises four departments - Treasury, Rates and Budget, Controller, and Risk Management. The Administration Division, headed by the Director of Administration, comprises six departments - Human Resources, Management Information Systems, Procurement, Real Property and Environmental Management, Fleet Services, and Facilities Management.

The Law Division addresses legal and regulatory issues involving the Authority.

Brief resumes of the Authority’s senior management appear below:

Frederick A. Laskey, *Executive Director*

Mr. Laskey was appointed Executive Director in May 2001. Before joining the Authority in June 2001, Mr. Laskey served as Commissioner of the Massachusetts Department of Revenue from 1999 to 2001, managing the Commonwealth’s tax administration, child support enforcement and local services. He served as Secretary of Administration and Finance from 1998 to 1999. As Secretary, he was the Governor’s chief fiscal advisor, with oversight of the state’s annual budget and managed the Cabinet Secretariat that oversees the entire state workforce. Before joining the Cabinet, Mr. Laskey served as Senior Deputy Commissioner of the Massachusetts Department of Revenue from 1994 to 1998, and was designated by the Commissioner to serve on the Board of Bank Incorporation. From 1993 to 1994, he served as Assistant Secretary in the Executive Office for Administration and Finance. Mr. Laskey holds a Bachelor of Arts degree in political science and history from University of Massachusetts, Boston. Mr. Laskey has a contract with the Authority that expires in June 2021.

David W. Coppes, *Chief Operating Officer*

Mr. Coppes was appointed Chief Operating Officer in February 2018. Prior to this appointment, Mr. Coppes served as the Director of Waterworks from 2014 to 2018, overseeing the planning, operation and maintenance of all of the Authority’s water supply facilities. Previously he served as the Director of Western Operations for the Waterworks System (2002 to 2014) and Manager of Operations Engineering (1996 to 2002), and was responsible for the management of individual capital construction projects for the Authority (1993 to 1996). Prior to joining the Authority, Mr. Coppes worked as a consulting engineer for Fay, Spofford & Thorndike, Inc. (1988 to 1993) and for E.J. Flynn Engineers, Inc. (1986 to 1988). Mr. Coppes is a Massachusetts Registered Professional Civil Engineer and holds a Bachelor of Science degree in Civil Engineering from Cornell University.

Kathleen M. Murtagh, *Director, Tunnel Redundancy Program*

Ms. Murtagh was appointed as the Director of the then newly created Tunnel Redundancy Program in April 2018. She has more than 28 years of geotechnical engineering experience overseeing a broad range of civil engineering projects. Prior to her appointment, Ms. Murtagh served as a Vice President at CDM Smith Inc. Earlier in her career she was a geotechnical engineer at Haley and Aldrich, Inc. Ms. Murtagh has extensive underground and tunneling engineering experience, having worked on a wide range of tunneling projects of varying sizes and employing a variety of construction methods. Ms. Murtagh is a Massachusetts Registered Professional Engineer and holds a Bachelor of Science degree in Civil Engineering from the University of New Hampshire and a Master of Science in Civil Engineering from Virginia Polytechnic Institute and State University.

Thomas J. Durkin, *Director of Finance*

Mr. Durkin was appointed Director of Finance in January 2015; he previously had served as Treasurer of the Authority since January 2008. Prior to joining the Authority, Mr. Durkin was the Deputy City Manager for the City of Chelsea, Massachusetts. Mr. Durkin also served as Finance Director for the Cities of Chelsea and Beverly, Massachusetts and as Treasurer for the City of Peabody, Massachusetts. Mr. Durkin holds a Master of Science degree in Corporate Finance from Bentley College and a Bachelor of Arts degree from the University of Massachusetts, Lowell.

Michele S. Gillen, *Director of Administration*

Ms. Gillen was appointed Director of Administration in January 2015, formerly serving as Deputy Director of Administration and Finance of the Authority since October 2009. Prior to her appointment as Deputy Director of Administration and Finance, Ms. Gillen served as Director of Real Property and Environmental Management (2005 to 2009). Ms. Gillen also has held several positions within the Authority's Public Affairs Department. Ms. Gillen holds a Bachelor of Arts degree from Fordham University and a Master of Science degree from the University of Massachusetts at Boston.

Matthew R. Horan, *Treasurer*

Mr. Horan was appointed Treasurer in January 2015, formerly serving as Deputy Treasurer of the Authority since July 2008. Prior to his appointment as Deputy Treasurer, Mr. Horan served as the Authority's Project Manager, Debt and Finance (2003 to 2008). Mr. Horan also has held several positions within the Authority's Operations Division. Mr. Horan holds a Bachelor of Science degree and a Master of Science degree from Boston College.

Carolyn M. Francisco Murphy, *General Counsel*

Ms. Francisco Murphy was appointed General Counsel in July 2018, to be effective in September 2018. Ms. Francisco Murphy joined the Authority in January 2016 as the Director of Procurement. Prior to joining the Authority, Ms. Francisco Murphy had practiced law with the firm of Corwin & Corwin, LLP since September 1995. Prior to entering private practice, Ms. Francisco Murphy served as a law clerk to the Justices of the Massachusetts Superior Court. Ms. Francisco Murphy holds a law degree from Suffolk University and a bachelor's degree from Emmanuel College.

EMPLOYEES

As of March 1, 2019, the Authority had approximately 1,141 employees, including persons with professional qualifications in the fields of construction, engineering, environmental science, accounting, finance, law and management. The Authority believes that future staffing needs to support facilities constructed under the CIP are adequately reflected in its projected revenue requirements.

Under Massachusetts law, employees of the Authority have certain organizational and representational rights which include the right to organize, to bargain collectively by representatives of their choosing on questions of wages, hours and other terms and conditions of employment and to engage in lawful concerted activities for bargaining or other mutual aid or protection. The law prohibits strikes by Authority employees.

As of March 1, 2019, approximately 1,075 of the Authority's employees were organized into five collective bargaining units: Unit 1 is represented by United Steelworkers Local Union 9358; Unit 2 is represented by the American Federation of State, County and Municipal Employees Council 93 Local 1242; Unit 3 is represented by the National Association of Government Employees, Local R1-168; Unit 6 is represented by United Steelworkers Local Union 9360; and Unit 9 is represented by the Massachusetts Organization of State Engineers and Scientists.

The Authority's collective bargaining agreement with Unit 2 expires on March 31, 2020. The Authority's collective bargaining agreements with Units 1, 3, 6 and 9 expire on June 30, 2020.

The Act provides that no collective bargaining agreement entered into by the Authority shall limit inherent management rights including (i) employment, assignment and promotion of employees, (ii) termination and discharge of employees on reasonable grounds, (iii) determination of the Authority's levels of service and staffing and the methods, means and personnel for performing operations, (iv) supervision, evaluation and establishment of productivity standards, and (v) use of part-time regular employees and independent contractors and vendors.

The Authority believes that its relationships with its employees and their representatives are generally good.

ADVISORY BOARD

The Advisory Board to the Authority was established by the Act to serve as a liaison between the Authority and the Local Bodies. It is composed of one representative from 60 of the 61 original Local Bodies named in the Act (Lancaster is not represented on the Advisory Board), one from the Metropolitan Area Planning Council (a legislatively-created, comprehensive regional planning organization), and six persons appointed by the Governor to include an expert in environmental protection, one representative each from the Connecticut River basin, the Quabbin/Ware watershed areas and the Wachusett watershed area, and two persons qualified by membership or affiliation in organizations directly concerned with the recreational or commercial uses of Boston Harbor.

The Advisory Board, whose staff is headed by an executive director, is empowered by the Act to do the following:

- Name three members to the Authority's Board;
- Approve, subject to other requirements of the Act, extension of service to additional communities;
- Make recommendations to the Authority on annual expense budgets, capital facility programs and expenditure budgets and user charges;
- Hold hearings on matters relating to the Authority; and
- Make recommendations to the Governor and the Legislature regarding the Authority.

The Advisory Board actively monitors the Authority's programs from the perspective of the Authority's rate payers. In addition to participating in the process of formulating the Authority's current expense budgets and capital improvement programs, the Advisory Board has pursued legislative support for debt service assistance, watershed protection and other measures of interest to the Local Bodies. The Advisory Board works with the Authority to enhance community assistance programs and share technical information and resources. The Advisory Board also developed the sewer rate methodology upon which the Authority's Sewer System annual rates and charges are based. See "Rates and Charges - General."

The Authority and Advisory Board share the goals of improved service to the Local Bodies and additional financial assistance for the Authority's programs.

RETIREMENT SYSTEMS AND EMPLOYEE BENEFITS

All employees of the Authority are members of a contributory retirement system for public employees. The Act provides that all employees transferred to the Authority from the MDC on July 1, 1985 who were members of the State Employees' Retirement System (the "State System") shall remain members of the State System. All other employees of the Authority are members of a separate retirement system established in the Act known as the Massachusetts Water Resources Authority Retirement System (the "Authority System"). The Authority System is managed by a five-member board consisting of the Secretary of the Authority, *ex officio*, two members elected each for three-year terms by the present and retired members of the Authority System, a member appointed by the Authority for a three-year term, and another member selected by the other four members.

Neither the Authority nor the Authority System has any liability for retirement benefits paid to members of the State System. For these individuals, the total cost of benefits earned while employed by the Authority is paid by the Commonwealth and by the employees' own contributions. As of March 1, 2019, 43 employees of the Authority were members of the State System. While employees of the DCR Division of Water Supply Protection are not

members of the Authority System and the Authority is not directly responsible for the payment of benefits, the cost of such benefits are included in the computation of the expenses of the Division that are reimbursable in part by the Authority. See “The Systems - The Waterworks System.”

The retirement benefits of employees of the Authority System are funded in part by employee contributions and investment returns, and in part by the Authority. As of March 1, 2019, there were 1,118 active members, 103 inactive members, and 638 retirees in the Authority System. The Act requires the Authority to pay annually to the Authority System any amounts needed to finance any pension benefits earned by its members. The Authority System undertakes an actuarial study every two years, the most recently completed study being as of January 1, 2018 (the “2018 Pension Study”). The unfunded accrued liability reported in the 2018 Pension Study was estimated to be approximately \$27.7 million, resulting in the Authority System being approximately 95.0% funded. The Authority’s contributions to the Authority System for Fiscal Years 2014 through 2018 were approximately \$12.4 million (including a \$4.9 million optional payment), \$12.6 million (including an optional payment of \$4.8 million), \$8.2 million, \$4.6 million (including an optional payment of \$1.5 million), and \$3.3 million, respectively. The FY19 CEB includes a \$7.0 million contribution to the Authority System. The Authority is scheduled to make the necessary contributions so that the Authority System will be fully funded by the end of Fiscal Year 2026.

Employee contributions to both the State System and Authority System range from 5% of salary to not more than 11% of salary depending upon salary and the initial date of becoming a member of a system. Employees of the Authority do not participate in the federal Social Security Administration System.

GASB Statement No. 43, *Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans*, was effective for the Fiscal Year ending June 30, 2007. The Authority began to implement GASB Statement No. 45, *Accounting and Financial Reporting by Employers for Postemployment Benefits Other Than Pensions*, for the Fiscal Year ending June 30, 2008.

In addition to providing the pension benefits described above, the Authority provides other postemployment health care and life insurance benefits (“OPEB”) for retired employees through the Group Insurance Commission (“GIC”). GIC is a quasi-independent state agency that administers an agent multi-employer defined benefit OPEB plan (the “OPEB Plan”). The benefits, benefit levels, employee contributions and employer contributions are governed by and can be amended by the Authority. As of January 1, 2018, the most recent actuarial evaluation date for the Authority’s OPEB liability, approximately 746 retirees and survivors and 960 active employees met the eligibility requirements for the OPEB Plan and the unfunded actuarial accrued liability was determined to be \$122.0 million. At the end of Fiscal Year 2018, the Authority calculated its net OPEB obligation at \$121.2 million. The Authority previously decided not to fund any OPEB liability until the Authority System was fully funded. Based on the actuarial study of the Authority System completed as of January 1, 2015, which showed the Authority System was 98.3% funded, in Fiscal Year 2015 the Authority established an irrevocable OPEB trust (the “OPEB Trust”). The Authority began funding the OPEB Trust in April 2015 with an initial deposit of \$10.8 million, including \$10 million released from reserves in connection with certain modifications to the General Resolution that became effective in April 2015, and \$800,000 that had been segregated by the Authority toward its OPEB liability in Fiscal Year 2010. In Fiscal Years 2016, 2017 and 2018, \$5.2 million, \$4.9 million, and \$5.0 million, respectively, was deposited to the OPEB Trust. The FY19 CEB includes \$5.6 million for deposit to the OPEB Trust, which represents 50% of the actuarial determined contribution (the “ADC”) for Fiscal Year 2019, based on the January 1, 2018 actuarial evaluation. The Authority currently expects that the OPEB Trust will be funded annually at 50% of the ADC for the applicable fiscal year, based on the most current actuarial evaluation.

PUBLIC AFFAIRS

The Authority maintains strong relationships with the various constituencies it serves, including the Local Bodies, the Advisory Board, elected and appointed officials, interest groups, and the public at-large. Public outreach and education - critical to building support for the Authority’s operational and environmental objectives - are accomplished through a wide variety of activities, including community assistance programs, technical assistance to industrial customers, the Authority’s website, social media, rapid response to public inquiries, facility tours, informational publications, school education programs, intergovernmental and media liaisons, and targeted programs for communities impacted by Authority facilities.

FINANCIAL OPERATIONS

GENERAL

As required by the Act, the Authority's operations for sewage collection, treatment and disposal and for delivery of water are treated separately for accounting and billing purposes, and revenues, expenses, assets and funds pertaining to these two operations are segregated by function. Indirect administrative costs and capital costs are allocated to water or sewer operations, as appropriate. The Authority's Fiscal Year commences on July 1.

The Authority uses a budgetary system of accounting in setting its rates and charges and preparing its annual budget (the "Current Expense Budget" or "CEB") for its current expenses, including operating costs and direct and indirect administrative costs (collectively, "Current Expenses"). United States of America generally accepted accounting principles ("GAAP") are used by the Authority in preparing its monthly internal and annual audited financial statements.

Current and Capital Expense Budgets. In accordance with the Act, the Authority adopts annually a Current Expense Budget, which may be amended under certain circumstances. While the Authority's Current Expense Budget must be submitted to the Advisory Board for comment and recommendation not less than 60 days prior to its adoption, and amendments to the budget must be submitted to the Advisory Board no less than 30 days prior to their adoption, the Authority's Current Expense Budget is not subject to approval by any board (including the Advisory Board), department, agency or other instrumentality of the Commonwealth or any other governmental body.

The Act requires that the Authority adopt and update capital facilities programs for the Systems and capital expense budgets to implement and finance such programs. See "Capital Improvement Program."

MANAGEMENT AND FINANCIAL CONTROLS

The Authority uses a performance-based budgeting format for its Current Expense Budget, which provides a basis for measuring operating activities, strengthens managerial accountability for each of the departments and provides a framework for the apportionment of resources. The Authority also uses a system of monthly and quarterly reports on key management indicators. Presentation formats allow for month-to-month, year-to-date, and year-to-year comparisons.

The Authority uses a variety of fiscal management systems to monitor and control Current Expenses. In addition to weekly cash reports, the Authority monitors its spending through monthly variance reports for each of its cost centers. Variance explanations are prepared at the end of the first three quarters of the Fiscal Year. At the end of the second and third fiscal quarters, the budget variance report includes updated forecasts of year-end expenditures.

The Authority has instituted a set of fiscal controls for the CIP. The Authority prepares monthly and quarterly reports on capital budget performance and semi-annual variance analysis reports on the capital budget. From time-to-time, as necessary, the Authority follows its established budget amendment policy to make adjustments to the capital budget. Procurements are processed by a central department to ensure uniform contract language, standard safeguards and competitive bids for the Authority. Contract amendments and construction change orders are subject to critical review and evaluation by field and budget staff, procurement officers, and legal counsel. Resident inspectors monitor all construction in progress to ensure quality of material and workmanship. Claims by contractors are reviewed and negotiated by the Authority's inspection and legal staff. The Authority also has instituted audit procedures to examine wage, overhead and profit rates on professional service contracts.

The Authority has an integrated management information system for its financial functions, including general ledger, budget, accounts receivable, debt management, cash management, procurement, accounts payable, and payroll systems. The Authority regularly upgrades and enhances this system to ensure the ongoing efficiency of its operation.

The Authority's business plan defines critical operational goals and objectives, as well as related activities and improvements in support of these objectives. The Authority also has developed annual performance targets that provide a quantifiable standard against which to measure progress towards achieving these objectives.

OUTSTANDING AND PROPOSED INDEBTEDNESS

As of March 1, 2019, the Authority had Outstanding approximately \$3.0 billion of Bonds, \$979.9 million of Subordinated Bonds issued to the Massachusetts Clean Water Trust ("SRF Bonds"), \$782.2 million of Multi-Modal Subordinated General Revenue Bonds and Subordinated General Revenue Refunding Bonds (the "Variable Rate Bonds"), and a \$100 million revolving loan note (which, together with the SRF Bonds and the Variable Rate Bonds, constitute Subordinated Bonds), and \$75 million of CP Notes, which CP Notes constitute Subordinated Parity Bond Anticipation Notes. The interest on the CP Notes, but not the principal thereof, is secured by a lien on Revenues on parity with the lien securing other Subordinated Bonds. In addition to the bonds and notes listed above, in November 2007 the Authority received a loan from the Massachusetts Development Finance Agency of Clean Renewable Energy Bond proceeds, which loan is outstanding in the approximate amount of \$0.62 million and is payable from the General Fund. See Footnote 6 to the Authority's Financial Statements included in Appendix A for additional information on the Authority's Outstanding indebtedness.

The Authority has in place several credit and liquidity facilities from commercial banking institutions providing credit or liquidity, or both, support for certain of the Variable Rate Bonds, aggregating approximately \$494.1 million in principal amount. In addition, several other series of the Variable Rate Bonds, aggregating approximately \$228.1 million in principal amount, were purchased directly and are held by commercial banking institutions ("direct purchasers"). The credit and liquidity providers are secured on the same basis under the General Resolution as the owners of the Subordinated Bonds, including the direct purchasers. The Authority's agreements with the credit and liquidity providers and the direct purchasers contain the same financial covenants and liens on Revenues that are provided to all owners of Subordinated Bonds under the General Resolution. See Footnote 6 to the Authority's Financial Statements included in Appendix A for additional information on the Authority's Variable Rate Bonds.

The following table sets forth debt service on the Authority's Outstanding Secured Bonds, after giving effect to the issuance of the 2019 Bonds, for each Fiscal Year in which such Secured Bonds will be Outstanding.

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SECURED BOND DEBT SERVICE
(in thousands of dollars)

Fiscal Year	Debt Service On General Revenue Bonds		Debt Service On Subordinated Bonds ¹		Total Secured Bond Debt Service
	Principal	Interest	Principal	Interest ²	
	2019	\$ 111,255	\$ 151,926	\$ 105,753	
2020	114,815	152,445	114,710	58,379	440,349
2021	52,840	149,334	188,534	53,962	444,670
2022	121,320	145,272	123,749	47,224	437,566
2023	116,425	138,816	158,537	43,034	456,811
2024	177,765	131,493	113,752	38,353	461,363
2025	178,295	122,551	102,662	32,585	436,093
2026	164,725	113,923	100,913	29,127	408,688
2027	162,750	105,701	127,890	25,065	421,406
2028	176,460	97,201	95,060	20,542	389,262
2029	172,070	88,374	86,158	16,397	362,999
2030	166,430	79,788	57,043	15,339	318,599
2031	174,910	71,152	43,820	13,406	303,289
2032	155,910	62,805	42,294	12,279	273,288
2033	151,060	55,152	37,395	10,554	254,162
2034	103,210	48,836	37,359	9,340	198,746
2035	99,280	43,775	37,120	8,020	188,195
2036	115,225	38,431	34,851	6,623	195,130
2037	133,365	32,444	32,334	5,198	203,342
2038	127,935	26,262	27,805	1,702	183,703
2039	136,255	20,010	10,272	622	167,159
2040	124,055	13,969	4,008	450	142,482
2041	110,980	8,569	4,110	349	124,008
2042	58,605	4,678	3,161	259	66,703
2043	42,030	2,277	3,243	180	47,729
2044	16,095	817	1,441	113	18,466
2045	8,290	207	1,479	76	10,052
2046	0	0	1,517	39	1,556
Total	\$3,272,355	\$1,906,208	\$1,696,969	\$508,700	\$7,384,233

Totals may not sum due to rounding.

¹ Includes debt service on SRF Bonds, net of subsidy amounts. Does not include debt service on CP Notes or a revolving loan.

² The Authority has entered into several interest rate exchange agreements (“swaps”), pursuant to which the Authority pays interest to the swap counterparty at a fixed rate and receives interest at a variable rate. The table assumes the fixed rate of interest payable under these swaps, inclusive of fees, with respect to a related portion of Subordinated Bonds for the periods in which the swaps are in effect. Variable rate indebtedness not covered by a swap is included at 4%. See “Financial Operations – Interest Rate Exchange Agreements.”

The Authority expects to issue additional Secured Bonds from Fiscal Year 2019 through Fiscal Year 2023 to finance the CIP. See “Rates and Charges – Future Rates and Charges”. The Authority’s future borrowing needs will be based on the actual size and timing of capital expenditures, which vary based on actual project schedules. The Authority’s current expectations regarding the timing and amount of additional indebtedness also assume that a portion of the CIP will be funded through pay-as-you-go capital expenditures. They also assume legislative approval of adequate and timely increases in the Authority’s debt limit, if needed. See “Debt Limitation” below. Changes in the CIP or the ability of the Authority to fund the current planned level of pay-as-you-go capital expenditures could impact the Authority’s current expectations regarding future indebtedness. Although this Official Statement does not contain rate projections beyond Fiscal Year 2023, the Authority also expects to issue additional Secured Bonds beyond Fiscal Year 2023.

INTEREST RATE EXCHANGE AGREEMENTS

From time to time the Authority has entered into interest rate exchange agreements (“swaps”) with respect to certain of the Variable Rate Bonds. The Authority’s current payment obligations under the swaps are secured on a parity basis with Subordinated Bonds; however, any termination obligations would be payable only from amounts in the Commonwealth Obligation Fund. The Authority currently has five swaps in effect, pursuant to which the Authority pays a fixed rate of interest in exchange for a floating rate of interest paid by the swap counterparty, and one swap with a forward starting date in 2030, pursuant to which the Authority will pay a fixed rate of interest in exchange for a floating rate of interest to be paid by the swap counterparty, as shown in the table below.

Counterparty	Outstanding Notional Amount As of March 1, 2019	Fixed Rate Payable by MWRA	Variable Rate Payable to MWRA	Termination
Citigroup Financial Products, Inc.	\$58.0 million	3.994%	SIFMA	2026
Morgan Stanley Capital Services Inc.	\$38.7 million	4.033%	SIFMA	2026
Barclays Bank PLC	\$133.3 million	5.144% increasing to 6.585% on 08/01/19	67% of 3-month LIBOR + 0.13%	2030
Wells Fargo Bank, N.A.	\$133.3 million	5.494% increasing to 6.935% on 08/01/19	SIFMA	2030
Barclays Bank PLC*	\$70.4 million	6.585%	67% of 3-month LIBOR + 0.13%	2037

*Term commences in 2030.

DEBT LIMITATION

The Act contains a limitation on the total amount of unfunded bonds and notes of the Authority that may be outstanding at any one time. The debt limit is currently \$6.45 billion. As of March 1, 2019, the Authority had outstanding approximately \$5.0 billion of bonds and notes.

The Authority periodically has requested and received increases in its debt limit to allow for the issuance of bonds to finance the CIP. The Authority expects to seek additional increases in the limit, if necessary, in order to finance the CIP in the future. Any such increase is subject to legislative approval. Failure to secure increases in the debt limit sufficient to finance the CIP as planned would require the Authority to adjust its construction plans and schedules and seek alternative sources of funding.

REPORTS

In accordance with the Act, the Authority prepares annual financial reports, which contain financial statements relating to its operations maintained in accordance with GAAP and audited by independent certified public accountants. The Authority also prepares five-year progress reports for the Governor, the President of the state Senate, the Speaker of the state House of Representatives, the Advisory Board and the Chairpersons of the state Senate and House Committees on Ways and Means. The five-year progress reports are prepared with the participation of an independent citizen panel, documenting activities of the prior period, and anticipated challenges for the future. The most recent five-year progress report was completed in September 2016 for the period ending December 2015.

Included in Appendix A are the audited financial statements of the Authority at June 30, 2018 and June 30, 2017 and for the Fiscal Years then ended, audited by CliftonLarsenAllen LLP, independent accountants. See “Financial Statements.”

Pursuant to the General Resolution, the Authority files with the Trustee a triennial report of the Consulting Engineer, setting forth a detailed analysis of the Authority's Systems, Current Expense Budget and CIP, including recommendations as to reserve requirements and other matters. The most recent triennial report, the 2017 Triennial Report, was completed in October 2017 and has been posted on the Municipal Securities Rulemaking Board's Electronic Municipal Market Access system ("EMMA") and can be found at <https://emma.msrb.org/ES1139302-ES891437-ES1292716.pdf>.

The Authority also files other reports and information from time to time with federal and state governmental authorities in accordance with legislative and regulatory requirements.

MANAGEMENT'S REVIEW OF OPERATING RESULTS

HISTORICAL REVENUES, EXPENSES AND FUND DEPOSITS

The following table is prepared in accordance with the General Resolution and sets forth a summary of the Authority's historical revenues, expenses and fund deposits for Fiscal Years 2014 through 2018. For financial statements prepared in accordance with GAAP regarding Fiscal Year 2018, see Appendix A - "Financial Statements of the Authority."

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HISTORICAL REVENUES, EXPENSES AND FUND DEPOSITS
(in thousands of dollars)

	<u>FY 2014</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u>
Revenues					
Rates and Charges	\$628,721	\$650,316	\$681,224	\$703,688	\$726,073
Investment Income ¹	12,130	9,689	10,303	9,758	12,756
Transfer from Rate Stabilization Fund	3,500	0	0	0	0
Other Income	<u>19,296</u>	<u>18,289</u>	<u>15,750</u>	<u>13,088</u>	<u>12,230</u>
Total Revenues	<u>\$663,647</u>	<u>\$678,294</u>	<u>\$707,277</u>	<u>\$726,534</u>	<u>\$751,059</u>
Operating Expenses ²	\$257,724	\$258,534	\$293,682	\$258,046	\$263,226
Capital Lease	<u>3,217</u>	<u>3,217</u>	<u>3,217</u>	<u>3,217</u>	<u>3,217</u>
Net Operating Revenues	<u>\$402,706</u>	<u>\$416,543</u>	<u>\$410,378</u>	<u>\$465,271</u>	<u>\$484,616</u>
Debt Service on Bonds	\$228,652	\$233,079	\$274,212	\$286,666	\$279,790
Other Debt Service ³	166,032	161,736	114,481	139,430	158,485
Debt Prepayment	<u>0</u>	<u>0</u>	<u>0</u>	<u>10,995</u>	<u>10,900</u>
Amount Available After Operations and Debt Service	<u>\$ 14,022</u>	<u>\$ 21,728</u>	<u>\$ 21,685</u>	<u>\$ 28,180</u>	<u>\$ 35,441</u>
Fund Deposits					
Reserve Funds	\$ 169	\$ 483	\$ (35)	\$ (168)	\$ 821
Construction Fund ⁴	\$ 9,516	\$ 10,464	\$ 11,462	\$ 13,059	\$ 14,683
Core Fund ⁵	\$ 132	\$ 730	N/A	N/A	N/A
Rate Stabilization ⁶	-	-	-	-	\$ 6,532

¹ Unrealized gains or losses recorded on investments are excluded.

² Includes payment of certain Commonwealth Obligations, that are paid after Debt Service on Secured Bonds and that are not included in Operating Expenses for purposes of calculating certain Coverage Covenants; excludes depreciation.

³ Includes debt service on variable rate Subordinated Bonds, including Authority Trust Obligations. Excludes amortized issuance expenses, refinanced principal payments, and interest on CP Notes.

⁴ Includes deposits from current revenue to fund capital projects.

⁵ The Community Obligation and Revenue Enhancement ("CORE") Fund was eliminated pursuant to amendments to the General Resolution effective in April 2015.

⁶ The Authority commenced Rate Stabilization Fund deposits in Fiscal Year 2018 to mitigate anticipated future rate increases due to the replacement of an electric power cable servicing the Deer Island Treatment Plant. See "Environmental Regulation and Litigation – Wastewater Management – Cross Harbor Power Cable: Resolution of Litigation."

FISCAL YEAR 2014

The Fiscal Year 2014 Current Expense Budget (the "FY14 CEB") was adopted by the Board in June 2013. The FY14 CEB totaled approximately \$658.4 million. Non-rate revenue totaled approximately \$29.7 million, resulting in a rate revenue requirement of \$628.7 million, an increase of approximately 3.5% over Fiscal Year 2013. The FY14 CEB assumed that the Authority would receive no debt service assistance for Fiscal Year 2014 or thereafter. The FY14 CEB used \$3.5 million of rate stabilization funds.

The FY14 CEB included approximately \$658.4 million in current expenses for Fiscal Year 2014, consisting of approximately \$214.4 million in direct expenses, \$46.8 million of indirect expenses, and \$397.2 million of capital financing expenses. Total FY14 CEB expenses increased by \$24.4 million, or 3.9%, over Fiscal Year 2013 actual expenses, of which \$17.0 million represented increased capital financing expenses before offsets, a 4.5% increase over Fiscal Year 2013 actual capital financing expenses. Capital financing expenses accounted for approximately 60.3% of total budgeted expenses for Fiscal Year 2014.

Total actual expenses in Fiscal Year 2014 were approximately \$659.4 million, or approximately 0.2% less than budgeted. Direct expenses of approximately \$211.6 million were approximately 1.3% less than budgeted, capital financing expenses of approximately \$401.5 million (including funds in the amount of \$26.2 million applied to an optional defeasance) were approximately 1.1% more than budgeted, and indirect expenses of approximately \$46.3 million were approximately 1.1% less than budgeted.

Total actual revenues for Fiscal Year 2014 were approximately \$663.6 million or approximately 0.8% more than budgeted.

FISCAL YEAR 2015

The Fiscal Year 2015 Current Expense Budget (the “FY15 CEB”) was adopted by the Board in June 2014. The FY15 CEB totaled \$674.5 million. Non-rate revenue totaled approximately \$24.2 million, resulting in a rate revenue requirement of \$650.32 million, an increase of 3.4% over Fiscal Year 2014. The FY15 CEB used no rate stabilization funds and assumed the Authority would receive no debt service assistance in Fiscal Year 2015 or thereafter.

Total FY15 CEB expenses increased by \$16.1 million, or 2.4%, over the current expense budget for Fiscal Year 2014, of which \$12.6 million represented increased capital financing expenses. The FY15 CEB included approximately \$674.5 million in current expenses for Fiscal Year 2015, consisting of approximately \$217.1 million of direct expenses, \$47.5 million of indirect expenses, and \$409.8 million of capital financing expenses. Based on the FY15 CEB, the Authority established a rate increase of 3.4% for Fiscal Year 2015.

Total actual expenses in Fiscal Year 2015 were approximately \$6.2 million or 0.9% less than budgeted. Direct expenses were approximately \$4.7 million less than budgeted, primarily due to actual utilities and wages and salaries being less than budgeted, and capital financing expenses of approximately \$409.2 million (including optional cash defeasances totaling \$26.5 million of certain Bonds) were approximately \$0.6 million less than budgeted.

Total actual revenues for Fiscal Year 2015 were approximately \$3.8 million or approximately 0.6% more than budgeted.

FISCAL YEAR 2016

The Fiscal Year 2016 Current Expense Budget (the “FY16 CEB”) was adopted by the Board in June 2015. The FY16 CEB totaled approximately \$702.5 million. Non-rate revenue totaled approximately \$30.3 million, resulting in a rate revenue requirement of \$672.4 million, an increase of 3.4% over Fiscal Year 2015. The FY16 CEB used no rate stabilization funds and assumed that the Authority would receive no new debt service assistance in Fiscal Year 2016 or thereafter.

The FY16 CEB included approximately \$702.5 million in current budgeted expenses for Fiscal Year 2016, consisting of approximately \$222.8 million of direct expenses, \$47.0 million of indirect expenses, and \$432.7 million of capital financing expenses. Total FY16 CEB expenses increased by \$34.2 million, or 5.1%, over Fiscal Year 2015 actual expenditures, of which \$23.5 million represents increased capital financing expenses, a 5.7% increase over Fiscal Year 2015 actual capital financing expenses. Capital financing expenses accounted for approximately 61.6% of total budgeted expenses for Fiscal Year 2016.

Total actual expenses for Fiscal Year 2016 were \$697.1 million, or 0.8% less than budgeted, direct expenses of \$216.0 million were 3.0% less than budgeted, capital financing expenses of \$403.4 million were 6.8% less than budgeted, and indirect expenses of \$77.6 million were 65.3% more than budgeted, which was due to the prepayment to the Commonwealth of certain Commonwealth debt service obligations that the Authority is required to pay (the “Commonwealth Obligations”) for watershed preservation projects undertaken by the DCR Division of Water Supply Protection. This prepayment covered the Authority’s annual obligation to the Commonwealth for the Commonwealth Obligations in Fiscal Years 2017 through 2022.

FISCAL YEAR 2017

The Fiscal Year 2017 Current Expense Budget (the “FY17 CEB”) was adopted by the Board in June 2016. The FY17 CEB totaled \$719.6 million, an increase of 2.4% over the FY16 CEB. Non-rate revenue totaled approximately \$24.7 million, resulting in a rate revenue requirement of \$694.9 million, an increase of approximately 3.3% over Fiscal Year 2016. The FY17 CEB used no rate stabilization funds or bond redemption funds. The FY17

CEB assumed the Authority would receive no additional debt service assistance in Fiscal Year 2017 or thereafter, however, it utilized debt service assistance in the amount of \$0.8 million received by the Authority in June 2016.

Total FY17 CEB expenses increased by \$17.1 million, or 2.4%, over the FY16 CEB, with an increase in capital financing expenses of \$22.4 million, an increase in direct expenses of \$3.7 million, and a decrease in indirect operating expenses of \$9.0 million. The FY17 CEB includes \$226.5 million of direct expenses, \$38.0 million of indirect expenses, and \$455.1 million of capital financing expenses. Capital financing expenses represent 63.2% of total expenses in the FY17 CEB.

Total actual expenses in Fiscal Year 2017 were approximately \$8.2 million or 1.1% less than budgeted. Direct expenses were approximately \$5.8 million less than budgeted, primarily due to actual wages and salaries and utilities being less than budgeted, and indirect expenses being \$0.6 million, or 1.7%, less than budgeted. Capital financing expenses of approximately \$453.4 million (including optional cash defeasances totaling \$25.0 million of certain of Bonds) were approximately \$1.8 million less than budgeted.

Total actual revenues for Fiscal Year 2017 were approximately \$6.9 million or approximately 1.0% more than budgeted.

FISCAL YEAR 2018

The Fiscal Year 2018 CEB (the "FY18 CEB") was adopted by the Board in June 2017. The FY18 CEB totaled \$743.6 million, an increase of 3.3% over the FY17 CEB. Non-rate revenue totaled \$26.6 million, resulting in a rate revenue requirement of \$717.1 million, an increase of approximately 3.2% over Fiscal Year 2017. The FY18 CEB assumed that the Authority would not receive any additional state debt service assistance for Fiscal Year 2018 or thereafter, however, the FY18 CEB utilizes debt service assistance in the amount of \$0.4 million received by the Authority in June 2017. The FY18 CEB did not use any rate stabilization funds or bond redemption funds.

Total expenses in the FY18 CEB increased by \$24.0 million, or 3.3%, over the FY17 CEB, with an increase in capital financing expenses of \$17.1 million, an increase in direct expenses of \$6.0 million, and an increase in indirect operating expenses of \$0.9 million. The FY18 CEB included \$232.6 million of direct expenses, \$38.9 million of indirect expenses, and \$472.2 million of capital financing expenses. Capital financing expenses represented 63.5% of total expenses in the FY18 CEB.

Total actual expenses in Fiscal Year 2018 were approximately \$6.8 million, or 0.9% less than budgeted, direct expenses of \$224.7 million were 3.4% less than budgeted, capital financing expenses of \$473.6 million (including optional cash defeasances totaling \$19.1 million of certain of Bonds) were 0.3% more than budgeted, and indirect expenses of \$38.5 million were 1.0% less than budgeted. Direct expenses were less than budgeted due primarily to wages and salaries, maintenance expenses, fringe benefits, and chemicals being less than budgeted, although expenditures for overtime and utilities were higher than budgeted.

Total actual revenues for Fiscal Year 2018 were approximately \$7.4 million or 1.0% more than budgeted.

FISCAL YEAR 2019 CURRENT EXPENSE BUDGET AND THIRD QUARTER RESULTS

The FY19 CEB was adopted by the Board in June 2018. The FY19 CEB totals \$767.9 million, an increase of 3.3% over the FY18 CEB. Non-rate revenue totals \$28.9 million, resulting in a rate revenue requirement of \$739.0 million, an increase of 3.1% over Fiscal Year 2018. The FY19 CEB continues to assume that the Authority will not receive any additional state debt service assistance in Fiscal Year 2019 or thereafter, although the FY19 CEB utilizes approximately \$0.9 million for state debt service assistance allocated to the Authority in May 2018. The FY19 CEB does not use any rate stabilization funds or bond redemption funds.

Total expenses in the FY19 CEB increased by \$24.3 million, or 3.3%, over the FY18 CEB, with an increase in capital financing expenses of \$10.2 million (after application of the debt service assistance allocated to the Authority in Fiscal Year 2018), an increase in direct expenses of \$7.0 million, and an increase in indirect expenses of \$7.1 million. The FY19 CEB includes \$239.6 million of direct expenses, \$46.0 million of indirect

expenses, and \$482.4 million of capital financing expenses. Capital financing expenses represent 62.8% of total expenses in the FY19 CEB.

As of the end of the third fiscal quarter of Fiscal Year 2019, total expenses were \$14.8 million, or 2.2% less than budgeted, direct expenses of \$170.1 million were 2.5% less than budgeted, capital financing expenses of \$345.5 million were 2.0% less than budgeted, and indirect expenses of \$31.6 million were 1.5% less than budgeted. Direct expenses were less than budgeted due primarily to wages and salaries, maintenance expenses, professional services, other materials and fringe benefits being less than budgeted.

Total revenue through the third quarter of Fiscal Year 2019 was \$578.7 million or 0.5% more than budgeted.

DEBT SERVICE COVERAGE

The Authority has met or exceeded the Coverage Covenants, as required by the General Resolution, in each of the last five Fiscal Years, as shown in the following table. For a discussion of projected debt service coverage, see Appendix B - "April 2019 Report of the Consulting Engineer."

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HISTORICAL COVERAGE

(in thousands of dollars)

	<u>FY2014</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u>
Operating Revenues	\$648,019	\$668,605	\$696,974	\$716,776	\$738,304
Interest Income	12,128	9,689	10,303	9,758	12,755
Transfers from Rate Stabilization Fund ¹	<u>3,500</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total Revenues	\$663,647	\$678,294	\$707,277	\$726,534	\$751,059
Operating Expenses	\$(273,500)	\$(271,329)	\$(278,887)	\$(266,415)	\$(263,630)
Commonwealth Obligations ²	26,641	27,168	27,470	23,912	23,757
OPEB ³	13,521	9,401	11,555	3,449	0
Pollution Remediation	2,261	3,394	322	4,752	1,225
Capital Lease	<u>(3,217)</u>	<u>(3,217)</u>	<u>(3,217)</u>	<u>(3,217)</u>	<u>(3,217)</u>
Net Revenues	\$ 429,353	\$ 443,711	\$ 464,520	\$ 489,015	\$509,194
CORE Fund Deposits	132	862	0	0	0
Revenues Available for Primary and SRF Primary Coverage (Before Provision for Transfer to Rate Stabilization Fund)(A)	<u>\$429,221</u>	<u>\$442,849</u>	<u>\$464,520</u>	<u>\$489,015</u>	<u>\$509,194</u>
Provision for Transfer to Rate Stabilization Fund ⁴	<u>\$ 0</u>	<u>\$ 0</u>	<u>\$ 0</u>	<u>\$ 0</u>	<u>\$ 6,532</u>
Revenues Available for Primary and SRF Primary Coverage (After Provision for Transfer to Rate Stabilization Fund)(B)	<u>\$429,221</u>	<u>\$442,849</u>	<u>\$464,520</u>	<u>\$489,015</u>	<u>\$502,662</u>
Required Senior Debt Service Fund Deposits(C)	<u>\$203,338</u>	<u>\$208,500</u>	<u>\$272,570</u>	<u>\$262,093</u>	<u>\$261,383</u>
Required Subordinated Debt Service Deposits(D)	<u>\$160,032</u>	<u>\$161,737</u>	<u>\$114,481</u>	<u>\$139,430</u>	<u>\$158,485</u>
Coverage:					
Before Provision for Transfer to Rate Stabilization Fund:					
Primary ⁵	211%	212%	170%	187%	195%
SRF Primary ⁶	118%	120%	120%	122%	121%
After Provision for Transfer to Rate Stabilization Fund:					
Primary ⁷	211%	212%	170%	187%	192%
SRF Primary ⁸	118%	120%	120%	122%	120%
Required CORE Fund Deposits ⁹	\$132	\$862	N/A	N/A	N/A
CORE Fund Deposits	\$132	\$862	N/A	N/A	N/A

¹ Amounts transferred from the Rate Stabilization Fund to the Revenue Fund are included as Revenues for coverage purposes in the year of such transfer up to an amount equal to 0.1 times Required Debt Service Fund Deposits for such year. Consistent with this treatment, in calculating coverage for a Fiscal Year, moneys transferred to the Rate Stabilization Fund are not included as Revenues.

² Commonwealth Obligations are paid after debt service on Bonds and are, therefore, excluded from Operating Expenses in calculating coverage.

³ Represents the Authority's OPEB liability under GASB 45.

⁴ The Authority commenced Rate Stabilization Fund deposits in Fiscal Year 2018 to mitigate anticipated future rate increases due to the replacement of an electric power cable servicing the Deer Island Treatment Plant. See "Environmental Regulation and Litigation – Wastewater Management – Cross Harbor Power Cable: Resolution of Litigation."

⁵ A divided by C.

⁶ A divided by the sum of C and D.

⁷ B divided by C.

⁸ B divided by sum of C and D.

⁹ The CORE Fund was required to be funded at the end of each Fiscal Year in the amount of at least 10% of the Required Debt Service Fund Deposits for all Bonds Outstanding as of the beginning of such Fiscal Year. The CORE Fund was eliminated pursuant to amendments to the General Resolution effective in April 2015; the Authority made monthly deposits to the Core Fund through April 2015.

THE SYSTEMS

THE WATERWORKS SYSTEM

History. Boston and surrounding communities have one of the oldest public water supply systems in the United States, dating to 1652 when the “Water Works Company” was incorporated to construct Boston’s first waterworks facility. Facilities were added over the years to meet increasing demand, and by the mid-1800s, a large scale water supply system utilizing cast iron pipes from a series of area reservoirs had been fully developed. In 1895, after a major study of the existing Boston metropolitan water supply and demand forecasts, work was begun on a major expansion project, the Wachusett Reservoir and Aqueduct. Construction of the Wachusett Reservoir, finished in 1908, more than doubled the system’s yield. In 1919, after the state Legislature commissioned a second major water supply study, planning was begun for the Quabbin Reservoir. Construction of the Quabbin Reservoir, completed in 1939 and filled to capacity by 1946, represented the last major expansion of the system’s water supply, increasing the reservoirs’ total storage capacity from 78 billion gallons to approximately 490 billion gallons, and the watershed area from approximately 185 square miles to approximately 467 square miles.

Water Supply. The Act granted to the Authority the exclusive right to utilize for water supply purposes all of the water from the existing DCR Watershed System as may be safely yielded. The safe yield is defined to be the average quantity of water that can be supplied on a continuous basis through a drought period. Under present operating rules the Authority’s water sources can supply a safe yield of approximately 300 million gallons per day (“mgd”). The Authority’s statutory right to utilize water derived from the DCR Watershed System includes the delivery, distribution and sale of water and the receipt by the Authority of revenues from charges relating to such delivery, distribution and sale.

DCR’s Division of Water Supply Protection (the “Division”) is responsible for management and maintenance of the DCR Watershed System, including a mandate to construct, maintain and operate a system of watersheds, reservoirs, water rights and rights in sources of water supply, and to supply a sufficient supply of pure water to the Authority. Other DCR responsibilities include forestry and wildlife management; conservation of water, land and other natural resources; preservation of the environment; and operation of a visitor’s center at the Quabbin Reservoir. The Authority must pay the Commonwealth for the Division’s watershed management and maintenance costs.

The present major sources of water to the Waterworks System are the watersheds of the Quabbin Reservoir, the Ware River and the Wachusett Reservoir. Other standby sources include the Sudbury Reservoir and the Framingham Reservoir No. 3. The Quabbin Reservoir, located approximately 65 miles west of Boston, is one of the largest reservoirs in the world built exclusively for water supply purposes, covering 39 square miles with a capacity of 412 billion gallons. Water for the Quabbin Reservoir is derived from the impounded Swift River, a tributary of the Connecticut River, with a runoff from 186 square miles of watershed. In addition, a limited quantity of the runoff from 98 square miles of the Ware River watershed is diverted to the Quabbin Reservoir.

The Wachusett Reservoir is located in central Massachusetts, approximately 35 miles west of Boston. The Wachusett Reservoir has a capacity of 65 billion gallons and a surface area of approximately 6.5 square miles. The Sudbury Reservoir, in the Sudbury River watershed, has an 8.4 billion gallon capacity and a surface area of approximately two square miles. Framingham Reservoir No. 3, also in the Sudbury River watershed, has a capacity of 1.2 billion gallons and a surface area of approximately one-half of a square mile. The Sudbury and Framingham Reservoirs are currently maintained off-line for emergency use only.

In close conjunction with the Authority, DCR has developed and implemented Watershed Protection Plans for the Quabbin, Wachusett and Ware watershed areas to protect water quality in the reservoirs. Components of this program include a land acquisition program funded by the Authority targeting critical lands over 15 years, a completed sewer project to improve tributary water quality, public access controls around the reservoir, state regulations on development in critical areas along tributaries, and a substantial water quality monitoring and research program. Updated five-year protection programs for all three watersheds, covering the 2019-2023 period, have been approved by DEP. The plans focus on continuing protection efforts to minimize the level of pathogens and nutrient pollution entering the reservoir.

Water Transmission and Distribution. Because of the variety of local conditions and elevations, six water pressure zones are required for the waterworks service area. These six zones are supplied through tunnels and aqueducts from the two active source water reservoirs and water is distributed through pumping and major transmission and storage facilities, all of which are owned and maintained by the Authority. Major system components include approximately 350 miles of aqueducts, tunnels and mains, 12 active distribution storage reservoirs and standpipes, 11 active pumping stations, and three active hydro-electric power stations.

Water from the Quabbin Reservoir, which has an elevation 530 feet above the base elevation of Boston, is delivered to the Wachusett Reservoir by the Quabbin Aqueduct, a 24.6-mile tunnel. From the Wachusett Reservoir, water is delivered through the eight-mile Cosgrove Tunnel, built in the 1960s, and the Wachusett Aqueduct, first used in 1898, to the Hultman Aqueduct intake structure in Marlborough and to the Weston Reservoir via the Weston Aqueduct. The Hultman Aqueduct, in service since the 1940s, connects with the Cosgrove Tunnel and continues the delivery of water 17.8 miles into the Boston area. Water from the Wachusett Reservoir and the back-up Sudbury Reservoir can be delivered in an emergency through the 17.5-mile Sudbury Aqueduct, built in 1878, to the Chestnut Hill Reservoir which is now off-line. With the completion of the 17.6-mile MetroWest Water Supply Tunnel, the Hultman Aqueduct was rehabilitated in phases and now provides redundancy for large segments of the MetroWest Water Supply Tunnel. The Authority is undertaking several additional projects designed to provide further redundancy to the water transmission system, including a new pump station at the Wachusett Aqueduct. In addition, the Board has approved undertaking preliminary design and geotechnical investigations for two deep rock tunnels that will provide significant redundancy for the water distribution system serving the metropolitan Boston area. See “Capital Improvement Program - Capital Projects In FY19 CIP - Waterworks Projects - Transmission System.”

The major links of the water supply distribution system in the Boston area are the Authority’s 5.4-mile City Tunnel, a 7.1 mile City Tunnel Extension serving communities north of Boston, and the Dorchester Tunnel, a 6.4-mile tunnel providing distribution to communities south of Boston. The Authority provides water supply to each Local Body through one or more metered connections and through certain non-metered connections that are used on an emergency basis only. Less than 5% of monthly water consumption is estimated, rather than metered, due to the necessary use of an emergency connection or to a faulty meter or other system malfunction. The water distribution system has a total of 160 metered connections and approximately 73 non-metered emergency connections. The Authority is responsible for the maintenance of the water distribution system to and including the metered connection or, in the case of an emergency connection, the emergency valve. Local Bodies distribute water to their retail customers through approximately 6,000 miles of community-maintained water pipelines.

Water Quality. The Authority received a waiver from DEP of filtration requirements for water supplied from Wachusett Reservoir to the metropolitan Boston area. To meet the waiver requirements and to comply with applicable SDWA regulations, the Authority constructed the John J. Carroll Water Treatment Plant (previously referred to as the Walnut Hill Water Treatment Plant) (the “Carroll Water Treatment Plant”) in Marlborough, and later a second primary disinfection treatment process at the Carroll Water Treatment Plant. See “Environmental Regulation and Litigation - Water Supply - Drinking Water Regulation.” The Carroll Water Treatment Plant has a maximum daily design capacity of 405 mgd and an average daily design capacity of 270 mgd.

The Authority has eliminated the use of open distribution reservoirs, which are vulnerable to airborne contaminants and allow the growth of bacteria, plants and algae, by constructing covered storage facilities. Approximately 2.4 billion gallons of open reservoirs have been replaced with more than 200 million gallons of covered storage downstream of the Carroll Water Treatment Plant.

The Authority received a conditional waiver from DEP of filtration requirements for water supplied to three communities in western Massachusetts by the Chicopee Valley Aqueduct from the Ware River/Quabbin Reservoir supply system. To meet the waiver conditions and improve disinfection and corrosion control to assure water quality and SDWA compliance, the Authority constructed a disinfection facility, the William A. Brutsch Water Treatment Facility (the “Brutsch Treatment Facility”) at Ware, and two 12.5 million gallon concrete water storage tanks to replace the open Nash Hill Reservoir. See “Environmental Regulation and Litigation - Water Supply - Drinking Water Regulation.”

The Authority's Local Water System Assistance Program, which began in Fiscal Year 2001, provides interest free loans to eligible Local Bodies to replace, rehabilitate, and maintain components of their waterworks systems.

The Authority works with state and local officials to increase awareness of water quality issues affecting the water distribution systems operated by the Authority and the Local Bodies, and collaborates with Local Bodies to deal with local water quality problems as they arise. The Authority has established a program to provide interest free loans, in an aggregate amount up to \$100 million, to Local Bodies to assist them in replacing lead service lines in their local water distribution systems. See "Capital Improvement Program - Capital Projects In FY19 CIP – Waterworks Projects – Other Waterworks Projects."

Water Demand. At the time the Authority assumed responsibility for the Waterworks System in 1985, the average daily withdrawal of water from the system had exceeded the safe yield of 300 mgd in each year since 1969. To address the problem, the Authority established programs for detecting and repairing leaks, encouraging conservation and reduced water use, preserving and developing local supply sources, and implementing a drought response plan. In large part as a result of the Authority's programs, water use declined by over 100 mgd since 1987, and since 1989 average daily withdrawals have been within the safe yield. Demand continues to decline due to continued improvements in water use efficiency changes in plumbing fixtures and appliances. Barring a drought more severe than any on record and assuming continuing conservation efforts and proper maintenance of the transmission and distribution system, the Authority projects that its existing supplies will be more than sufficient for its water supply needs through at least the year 2030. The Authority currently has no plans to develop any new sources of water. For a description of certain of the environmental and regulatory constraints involved in the process of augmenting the Authority's water supply, see "Environmental Regulation and Litigation - Water Supply - Expansion of Water Supplies."

Extension and Contraction of Waterworks Service Area. Under the Act, the Authority may extend the Waterworks System to additional communities not currently served on such reasonable terms as the Authority may determine. Such an extension of service requires that the Authority first make certain findings similar to those required to be made in connection with the continuation of water supply services to communities currently served under special acts or contracts. See "Local Bodies - Special Arrangements." Any extension of the Waterworks System is subject to the approval of the Governor, the state Legislature, the Advisory Board, and the regulatory bodies within the Commonwealth's Executive Office of Energy and Environmental Affairs ("EOEEA") having jurisdiction. Extension of the Waterworks System to any community not currently served by the Authority also requires the approval by majority vote of its city council or town meeting, as the case may be. The Authority also is authorized to enter into arrangements not involving an extension of the Waterworks System to provide water supply services to any community or any agency or facility of the Commonwealth or the United States not currently served, provided (i) no such arrangement shall extend for a period greater than six months without the approval of the Advisory Board, and (ii) the Authority finds that the arrangement will not jeopardize its ability to service its existing statutory and contractual supply agreements. In cases of water supply emergency, as determined by DEP, the Authority may approve a connection to an adjoining community.

The Authority has extended services to five additional Local Bodies since commencing operations of the Waterworks System in 1985. The Authority is in active discussions with several additional communities regarding the possible extension of the Waterworks System service area, in part due to the excess of supply available to the Authority's service area. The Authority does not expect that any additional admissions to the service area will result in the use of water demand above the safe yield of 300 mgd, and expects water usage to remain significantly under the safe yield for the foreseeable future.

A community requesting admission to the Waterworks System is required to pay an entrance fee for its proportional share of historic investments in the system, a connection fee to cover all costs associated with establishing a connection to the Waterworks System, and the prevailing water rate for all annual water consumption pursuant to the Authority's policy. The policy further requires a community that requests a temporary connection to the Waterworks System to pay a cost per million gallons which includes the prevailing water rate, a proportional asset value contribution, and, in certain recurring cases, a surcharge on the then-prevailing water rate (as well as the asset value contribution) of up to 10%. Should such a community ultimately seek admission to the Waterworks

System, any asset value contribution would be credited to its entrance fee, but the surcharge would be non-refundable and would not be credited to other costs.

A Local Body specified in the Act as eligible for receiving water supply services could seek to withdraw from the Waterworks System by state legislative action. However, in the opinion of the Authority and its Consulting Engineer, the cost and time required to implement adequate alternative water supply sources in accordance with existing and anticipated state and federal environmental laws and regulations generally would preclude this course of action as a practical matter for any substantial portion of the Waterworks System's service area.

THE SEWER SYSTEM

History. The Authority's existing wastewater facilities include certain components constructed as early as 1884, when the Boston Main Drainage System was originally placed in operation. At that time, combined sewage was pumped by a pump station constructed in 1884 to Moon Island in Boston Harbor, where sewage was held in storage tanks before being released on the outgoing tides. In 1898, the Neponset Valley Sewer System was completed, with flows sent to Moon Island through the Boston Main Drainage System. Also in 1898, a pump station was constructed on Deer Island in Boston Harbor to pump sewage from the metropolitan area north of Boston to Deer Island, where it was held in storage tanks before being released on the outgoing tides. In 1904, the original South Sewerage System was completed, conveying flow from the Charles River Watershed, the Neponset River Watershed and areas south of the Boston Main Drainage System. After screening at Nut Island, flows from the South Sewerage System were discharged into Boston Harbor. Some flow from the Boston Main Drainage System also was redirected to Nut Island. In response to concerns about water pollution, a primary wastewater treatment plant was constructed on Nut Island in 1952 to treat the discharge from the South Sewerage System and, in 1968, a second primary wastewater treatment plant at Deer Island was completed and flow from the Boston Main Drainage System began to be diverted to Deer Island.

Wastewater Collection. The Sewer System is divided into a northern system and southern system, serving a total population of approximately 2.3 million. The 43 Local Bodies within the Sewer System's service area own and operate approximately 5,400 miles of local sewers, which connect to the Authority's approximately 240 miles of large interceptor sewers located to parallel the natural drainage patterns of the Mystic, Charles and Neponset River Watersheds. Approximately one-third of the sewage treated by the Authority originates in the BWSC's wastewater conveyance system. The Authority operates and maintains the regional wastewater transport and treatment system, including 230 miles of interceptor sewer, 11 pumping stations, five headworks, four CSO treatment facilities, and the treatment plants at Deer Island and Clinton. The Local Bodies' sewer collection systems, some of which are combined sanitary and storm sewers, connect to the Authority's wastewater transport system through more than 1,800 connections.

The northern system includes four pumping stations that pump wastewater into interceptors, which carry the wastewater to four headworks where large debris is screened out and grit is removed. From the headworks, the wastewater flows down vertical shafts into one of two deep rock tunnels 300 feet under Boston Harbor, through which the wastewater is carried to Deer Island. Flow also is conveyed to Deer Island by means of a 10-foot diameter interceptor through Winthrop. At Deer Island a large pumping station, substantially rehabilitated in 1995, lifts the flow from the tunnels into the treatment plant.

The southern system includes seven pumping stations that pump wastewater into interceptors, which carry the wastewater to the High Level Sewer and ultimately to the Nut Island Headworks. At Nut Island, the headworks facility removes grit and screenings before the flow enters the Inter-Island Tunnel for transport to Deer Island, where it is lifted by pumps at the South System Pump Station to the treatment plant.

Wastewater Treatment. The Deer Island Treatment Plant includes, at Deer Island, pumping, headworks, odor control, disinfection, primary and secondary treatment and residual facilities, utilities (including a hydropower plant), a 4.8-mile deep rock inter-island tunnel that brings south system flows from Nut Island to Deer Island for treatment, and a 9.5-mile deep rock effluent outfall tunnel. Primary treatment design capacity at the Deer Island Treatment Plant allows for an average daily flow of approximately 361 mgd and a peak hourly flow of 1,270 mgd. Since the startup of the new primary treatment facilities at Deer Island in 1996, the Authority has consistently been in compliance with the discharge limitations specified in its National Pollutant Discharge Elimination System

("NPDES") permit issued under the Clean Water Act. Effluent wastewater is disinfected and discharged into Massachusetts Bay through a series of diffusers located at the end of the 9.5 mile effluent outfall tunnel, which has a maximum discharge capacity of 1,270 mgd at mean high tide. Sludge resulting from the treatment process is anaerobically digested and then piped to and processed at the dewatering and pelletization facility located at the Fore River Shipyard in Quincy. See "Residuals Management" below.

The wastewater treatment plant in Clinton serves an area adjoining the Wachusett Reservoir watershed lands in central Massachusetts made up of the towns of Clinton and Lancaster (served by the Lancaster Sewer District) and includes an advanced secondary treatment facility with a design capacity for an average flow of 3 mgd.

The Authority's Toxics Reduction and Control Department administers a permitting and inspection effort that allows for control and limitation of the volume and type of industrial waste discharged into the Sewer System so that both sludge and effluent from the treatment plants meet applicable environmental standards.

The Authority's sewer use regulations, which give the Authority the ability to assess civil and financial penalties directly against violators of its regulations and permits, have been coupled with vigorous enforcement measures.

Residuals Management. The Authority operates sludge dewatering and pelletization facilities located on a portion of the site of the former Fore River Shipyard in Quincy. Digested liquid sludge is piped to the site from Deer Island and is processed for use as fertilizer in agriculture, horticulture and turf management. Sludge cake or pellets that are not used as fertilizer are landfilled. The Authority has entered into a contract with New England Fertilizer Company ("NEFCo.") for both the operation and management of the plant and the disposition, through sale or otherwise, of the sludge. The current NEFCo. contract expires in 2020.

NEFCo. has a subcontract with a landfill operator for use in the event of emergencies. The Authority also maintains an emergency preparedness plan that identifies out-of-state landfills that could be utilized in the event that NEFCo. is not able to dispose of the wastewater residuals.

Combined Sewer Overflows; Infiltration and Inflow. Many older areas of Boston, Cambridge, Chelsea and Somerville are served by combined sewers, which are pipes that carry both sanitary flow and stormwater runoff. These sewers, built mostly before 1910, were designed to discharge combined flows in excess of the sewer systems' capacity into nearby waterways during heavy rainstorms to protect the system, as well as homes and businesses connected to it, from flooding. The Authority's and the Local Bodies' interceptors, trunk sewers, and pumping systems serving the combined sewer areas are not capable of fully handling combined flows generated by large storm events. Combined flows in excess of the sewer systems' capacities historically were diverted and discharged through overflow conduits into Boston Harbor, Dorchester Bay, the Charles, Mystic and Neponset Rivers, and Alewife Brook. These overflows had been a source of pollution in Boston Harbor and its tributary rivers. In connection with a Federal action brought against the MDC, as predecessor to the Authority, and others under the Clean Water Act (the "Clean Water Act Case"), the Authority developed, and the court approved, the CSO Control Plan, a long-term plan for control of CSOs. See "Environmental Regulation and Litigation – Wastewater Management – NPDES Permits" and "- Boston Harbor: Clean Water Act Case." The CSO Control Plan was developed to address discharges at 84 CSO outfalls hydraulically related to the Authority's Sewer System. The CSO Control Plan required that the Authority close certain outfalls and achieve specific, numerical long-term levels of control at each of the CSO outfalls that were permitted to remain open under the Plan. In December 2015, the Authority achieved substantial completion of the construction of the projects included in the CSO Control Plan. Under the CSO Control Plan, 29 of the 84 outfalls were closed to CSO discharges, five outfalls along the South Boston Beaches no longer activate up to a 25-year storm, and the discharge frequency and volume at the remaining outfalls have been significantly reduced. Additional CSO control has been achieved as a result of separate actions undertaken by certain Local Bodies with CSO permits, resulting in six more CSO outfalls, for a total of 35, being closed. The CSO Control Plan also required the Authority to construct or improve and upgrade four treatment facilities that provide screening, disinfection and dechlorination at those CSO outfalls that discharge the majority of the remaining CSO volume. As a result of these efforts, the total annual volume of CSO discharge in a typical rainfall year has been reduced by approximately 88%, from 3.3 billion gallons in 1988 to 0.4 billion gallons, with 93% of the remaining overflow receiving treatment at the Authority's four CSO facilities.

Further increasing the burden on the Sewer System are infiltration of groundwater into the Sewer System through leaks in pipes, joints and connections, and inflow of storm water from a number of sources into otherwise separate, local sewer systems (“infiltration and inflow”). The Authority has developed programs, including an Infiltration/Inflow Local Financial Assistance Program (a combined grant and interest-free loan program) to encourage and assist efforts to reduce infiltration and inflow within the local collection systems of the Local Bodies. See “Capital Improvement Program – Capital Improvement Planning.”

Extension and Contraction of Wastewater Service Area. The Act authorizes the Authority to provide sewer service for a limited term to any person within or outside its service area not currently connected to the Sewer System, provided any such arrangement does not entail an extension of the Sewer System or have a term in excess of six months (unless a longer term is approved by the Advisory Board). The Act authorizes the Authority to extend the Sewer System to additional local bodies, provided such extension is approved by the Governor, the state Legislature, the Advisory Board and DEP. Extension of the Sewer System to any community not currently served by the Authority also requires the approval by majority vote of its city council or town meeting, as the case may be. Prior to extending the Sewer System to any new local body, the Authority must determine that (i) the safe capacity of the Sewer System as so extended will be sufficient to meet ordinary wet weather demand, (ii) all feasible measures have been taken by the local body to limit infiltration and inflow of surface and ground waters into the Sewer System, and (iii) the local body has adopted an industrial pretreatment program in accordance with applicable law. At the present time, the Authority does not anticipate adding any communities to the Sewer System.

Although a Local Body could withdraw from the Sewer System by state legislative action, in the opinion of the Authority and its Consulting Engineer, existing and anticipated state and federal environmental laws and regulations would cause any alternative to the Authority’s wastewater collection services for a Local Body to be prohibitively expensive as a practical matter since it would require the construction of new treatment facilities in accordance with state and federal environmental laws.

SECURITY AND EMERGENCY PREPAREDNESS

The Authority has completed a Vulnerability Assessment and Emergency Response Plan, both mandated by the federal Bioterrorism Act of 2002, and maintains individual Emergency Action Plans for each facility, and event-driven plans for every reasonably foreseeable contingency. An Emergency Services Unit, established and funded through several Homeland Security grants, is trained and equipped to provide rapid response to any incidents of water system contamination. This Unit is equipped with boats, a boom deployment unit and a mobile laboratory, enabling it to respond to spills at any of the Authority’s open reservoirs and facilities. The Authority also utilizes a state-of-the-art, real-time water quality monitoring system at a number of locations throughout the Waterworks System, from the source reservoirs through to the distribution system. The system performs continual water quality testing and sends an alarm to the Authority’s operations and control center if a test indicates conditions outside of a normal range. The Authority has contracted with a cyber security firm to perform an assessment of the Authority’s information systems and to monitor them for potential external threats. The Authority’s facilities are patrolled by the Massachusetts State Police, and a private security service provides additional protection at the Deer Island Treatment Plant, the Authority’s Chelsea and Charlestown facilities, and the Carroll Water Treatment Plant. Guards also monitor cameras, intrusion alarms, key card access and fire alarms for major facilities at a central security monitoring point in Chelsea.

PREPARING FOR CLIMATE CHANGE

Included among the Authority’s long-term planning efforts has been a review of the potential impacts of climate change on the facilities comprising the Systems, as well as its operations. The Deer Island Treatment Plant was designed in 1989 to account for the then projected two feet sea level rise; the entire Plant was raised up and the effluent outfall tunnel was made slightly larger to protect the Plant and preserve its design capacity. The Plant also is protected by a massive seawall. The Authority also examined its other coastal wastewater facilities and identified approximately 18 of them that could be affected by storm surge flooding. The Authority has implemented short-term actions for the most vulnerable facilities. Longer-term modifications are being programmed into planned and anticipated rehabilitation projects for the identified facilities as part of the Authority’s Master Plan and ongoing CIP planning process. The Authority also has undertaken improvements to the dams in the Waterworks System as part of its ongoing CIP.

CAPITAL IMPROVEMENT PROGRAM

MASTER PLAN

The Authority prepared a 40-year master plan for the Systems in 2006 and has updated it approximately every five years, most recently in 2018 to cover Fiscal Years 2019 through 2058. The Master Plan is intended to be a companion document to the CIP. The goal of the Master Plan is to take a broad view of longer-term System needs in order for the Authority to make informed decisions on capital priorities during the development of the CIP. The Master Plan also helped to guide development of the current five-year capital spending cap, which is included in the FY19 CIP. The Master Plan covers four spending periods - the current and next five-year CIP program periods (Fiscal Years 2019 through 2023 and Fiscal Years 2024 through 2028), as well as an additional 10-year period (Fiscal Years 2029 through 2038) and 20-year period (Fiscal Years 2039 through 2058). The Master Plan includes and prioritizes all projects currently included in the FY19 CIP, and projects identified and recommended for inclusion in future CIPs. The Master Plan includes approximately \$5.75 billion in capital project needs over the next 40 years, including approximately \$2.58 billion for the Waterworks System and approximately \$3.17 billion for the Sewer System. For the Waterworks System, 69% of the capital project needs are attributable to the costs of completing major redundancy projects, including the Metropolitan Tunnel Redundancy Project, the largest project included in the FY19 CIP, and 31% of the capital project needs are attributable to ongoing asset projection, including the rehabilitation and replacement of existing facilities. More than 94%, or \$2.99 billion, of the capital project needs for the Sewer System are attributable to ongoing asset protection, including rehabilitation or replacement of existing infrastructure assets that are at the end of their useful lives. The remaining capital needs of the Sewer System are for new equipment and projects to optimize existing systems, add capacity, and upgrade technology.

CAPITAL IMPROVEMENT PLANNING

The Act requires the Authority to adopt and update capital facilities programs for the Systems and capital expense budgets to implement and finance such programs. The Authority annually prepares and updates the CIP. In June 2018, the Board approved the FY19 CIP, which includes spending for Fiscal Years 2019 through 2023, and projections beyond Fiscal Year 2023. The FY19 CIP reflects the Authority's ongoing efforts to manage rate increases to the Local Bodies while continuing to upgrade and maintain the Systems, and the Authority's effort to align its project prioritization process with the Master Plan.

The CIP describes all ongoing capital projects and new projects to be initiated during a 10-year planning period. The costs shown for each project in the CIP include any payments made on such project prior to the commencement of the 10-year planning period, the expected costs for such project for each year of a five-year budget period, and the expected balance of such costs through completion of the project, if completion is beyond the five-year budget period. The Authority updates the CIP annually and rolls it forward every five years. The five-year budget period included in the FY19 CIP is the period from Fiscal Year 2019 through Fiscal Year 2023 (the "Current Budget Period").

The Authority also establishes a five-year baseline cap corresponding to the five-year budget period included in the CIP. The Authority established a new baseline cap at \$984.8 million for Fiscal Years 2019 through 2023 (the "Current Cap Period"), in connection with the adoption of the FY19 CIP. The baseline cap does not include expenditures for the Authority's two community financial assistance programs – the Local Water System Assistance Program and the Infiltration/Inflow control program and for the Chicopee Valley Aqueduct system projects.

During the course of the Fiscal Year, the Authority's financial information system produces monthly statements of capital spending compared to the budget plan. The Authority reports on capital program progress in its monthly management indicators report and dollar variances in its monthly financial update. At mid-year and at year-end progress, project schedules and variances are summarized and reported. The Authority reviews and revises, as necessary, the scope and anticipated cost of the projects included in the CIP periodically during the course of the Fiscal Year.

FISCAL YEAR 2019 CIP

The FY19 CIP totals approximately \$8.0 billion, of which approximately \$4.3 billion had been expended through Fiscal Year 2018, with a remaining balance of \$3.7 billion.

The FY19 CIP includes planned expenditures of \$179.2 million for Fiscal Year 2019, total projected expenditures of approximately \$1.1 billion for Fiscal Years 2019 through 2023, and projected spending of \$2.7 billion for beyond Fiscal Year 2023, in each case exclusive of contingencies. The majority of spending in the FY19 CIP is in the areas of asset protection (71.0%) and water system redundancy (20.3%). During the Current Budget Period, approximately 35.2% of included spending is allocated to waterworks projects, 61.2% is allocated to wastewater projects, and the remaining 3.7% to business operations and support.

FISCAL YEAR 2019 CAPITAL IMPROVEMENT PROGRAM EXPENDITURE FORECAST FOR FISCAL YEARS 2019-2023^{1, 2} (in millions of dollars)

	<u>Total Contract Amount</u>	<u>Payments through FY18²</u>	<u>FY19</u>	<u>FY20</u>	<u>FY21</u>	<u>FY22</u>	<u>FY23</u>	<u>Total FY19-FY23³</u>	<u>Beyond FY23</u>
Wastewater System Improvements	\$3,603.6	\$2,070.1	\$ 93.8	\$183.2	\$157.5	\$120.4	\$ 88.2	\$643.2	\$ 890.3
Waterworks System Improvements	\$4,253.7	2,112.1	77.1	80.9	82.5	71.1	58.5	370.1	1,771.5
Business & Operations Support	<u>151.9</u>	<u>101.6</u>	<u>8.3</u>	<u>11.9</u>	<u>11.3</u>	<u>3.4</u>	<u>3.6</u>	<u>38.6</u>	<u>11.7</u>
Total³	\$8,009.1	\$4,283.8	\$179.2	\$276.1	\$251.3	\$194.9	\$150.4	\$1,051.8	\$2,673.5

¹ Does not include program contingency of \$59.4 million.

² Reflects FY19 CIP as adopted by the Board in June, 2018; not updated for Fiscal Year 2018 actual expenditures.

³ Totals may not sum due to rounding.

CAPITAL PROJECTS IN FY19 CIP

The majority of spending in the FY19 CIP reflects the Authority's primary focus on asset protection, water system redundancy, water pipeline replacement and rehabilitation, and community assistance programs. A description of the most significant projects included in the FY19 CIP follows, including the approximate costs for the Current Budget Period (Fiscal Years 2019 through 2023), except where noted.

Wastewater Projects

A substantial portion of the Authority's capital expenditures to date have been for improvements to the Sewer System, particularly the Boston Harbor Project. The FY19 CIP includes substantial funding in the area of asset protection to maintain the facilities constructed as part of the Boston Harbor Project, as well as other projects designed to maintain and improve the Sewer System. A description of the most significant projects included in the FY19 CIP follows.

Interception and Pumping. The Authority has undertaken several major projects to extend, enlarge and rehabilitate large sewer interceptors to alleviate sewer surcharging and overflow problems. These projects were necessitated by the age of the systems and their inadequate capacity to serve existing or projected populations. The Authority is now developing projects to ensure the proper maintenance and protection of these and other interception and pumping facility assets, including equipment replacement, facility improvements, and utility and process control system upgrades and improvements. Interception and pumping asset protection is the second largest Wastewater Project include in the FY19 CIP (\$188.7 million). The Authority also is undertaking a Corrosion and Odor Control Program to mitigate corrosion and odor impacts in portions of the Sewer System (\$41.5 million).

Treatment and Residuals. To protect the investment of MWRA ratepayers in the Deer Island Treatment Plant Project by ensuring timely replacement of Plant systems, which contain more than 60,000 pieces of equipment with an approximate value of \$1.0 billion, the Authority is continuing its significant asset protection program through maintenance and capital improvements at the Deer Island Treatment Plant, including equipment and system replacement and upgrades (the “DITP Asset Protection Project”). The DITP Asset Protection Project is the largest project in the FY19 CIP (\$305.3 million), representing approximately 29.0% of total spending during the Current Budget Period.

Combined Sewer Overflows. Discharges of combined wastewater and stormwater runoff from CSO outfalls in the Authority’s system and four of the Local Bodies’ systems (Boston, Cambridge, Chelsea and Somerville) historically compromised the water quality in Boston Harbor, Dorchester Bay, the Charles, Mystic and Neponset Rivers, and Alewife Brook. Under the Clean Water Act Case, the Authority had the responsibility for developing and implementing the CSO Control Plan, addressing the discharges from the 84 CSO outfalls within the service area of and hydraulically related to the Authority’s Sewer System. The construction component of this project is complete; the Authority is currently undertaking a three-year performance assessment of the CSO Control Plan. The FY19 CIP includes \$7.7 million remaining to be spent. See “Environmental Regulation and Litigation - Wastewater Management - Boston Harbor: Clean Water Act Case.”

Other Wastewater Projects. Included in the FY19 CIP is additional funding for the Authority’s Infiltration/Inflow Local Financial Assistance Program, which provides financial assistance to Local Bodies for the rehabilitation of their local collection systems, with the goal of structurally reducing infiltration/inflows into their local sewer systems and thereby reducing the volume of wastewater treated by the Authority at the Deer Island Treatment Plant (\$123.2 million, after crediting loan repayments expected during the Current Budget Period).

Waterworks Projects

Capital projects for the Waterworks System are designed to upgrade and extend the useful life of the water supply, transmission and distribution systems in order to assure a satisfactory and consistent level of water quality and distribution throughout the Waterworks System. Certain of these projects are mandated by federal regulatory requirements.

Drinking Water Quality Improvements. The Authority is undertaking a series of projects to protect reservoir watersheds, provide and improve water treatment facilities, and upgrade distribution storage and pipelines. The projects, as a whole, are designed to improve each aspect of the Waterworks System from the watersheds to the consumer to ensure that high quality water reliably reaches the Authority’s customers’ taps. The FY19 CIP includes \$8.1 million for these projects.

Transmission System. Critical needs of the Authority’s aqueduct system include the provision of redundancy for critical sections of the transmission system, particularly in the areas to the north and south of Boston. The Metropolitan Tunnel Redundancy Project, the largest project included in the CIP over the 10-year planning period, will provide critical redundancy for the City Tunnel, the City Tunnel Extension and the Dorchester Tunnel. The FY19 CIP includes \$14.5 million for the Current Budget Period, and \$1.4 billion for the period beyond Fiscal Year 2023 to fund this project. The project is expected to consist of two deep rock tunnels and related facilities and to be implemented over at least a 15-year period. The project is in the conceptual design stage. Given the magnitude of the project, the Authority has elected to follow the project management model used in the Boston Harbor Project, and has engaged a Director of the Tunnel Redundancy Program, who reports directly to the Executive Director. The director oversees and directs the design, construction, engineering and procurement activities for the project through a staff dedicated to the project. Interim improvements to the metropolitan water distribution system will be undertaken to protect and improve critical facilities while the Metropolitan Tunnel Redundancy Project is being undertaken. The FY19 CIP includes total expenditures of \$94.1 million for these projects during the Current Budget Period.

Distribution and Pumping. The FY19 CIP continues the rehabilitation, upgrade or new construction of pipelines, pumping facilities, valves and meters. Several large projects included in the FY19 CIP, consisting of improvements to the distribution and pumping systems designed to improve system performance and reliability, as well as provide extra storage and redundancy, include projects for the Northern Intermediate High Service Area

(\$42.1 million), the Northern Low Service Area (\$18.3 million), and the Southern Extra High Service Area (\$36.8 million).

Other Waterworks Projects. Among these projects are the Authority’s Local Water System Assistance Program (\$32.4 million, after crediting loan repayments expected during the Current Budget Period), which provides financial assistance to Local Bodies to undertake pipeline relining and replacement projects for their retail water distribution systems, including a program to provide interest-free loans to assist Local Bodies in replacing lead service lines, and Waterworks System facility asset protection (\$13.9 million).

Business and Operations Support and Contingency

Business and Operations Support. Business and operations support projects include vehicle and security equipment purchases, technical assistance contracts, funds for the upgrade of the Authority’s Management Information Systems, “green energy” projects, and security improvements.

Contingencies. In each budget cycle project contingency is estimated for a five-year period. The contingency is established as a percentage of the expected capital expenditure cash outlays in each of the Fiscal Years: 15% for tunnel construction and 7% for all other projects.

FACTORS AFFECTING THE CAPITAL PROJECTS

The following is not intended as a complete summary, but describes some of the uncertainties that may affect the Authority’s capital programs. Unforeseen circumstances affecting the projects may result in delays or cost escalations not currently provided for in the Authority’s projections.

The Authority must complete its capital projects in a complex legal and political environment. Many of its projects require special coordination among engineering, legal, and regulatory activities requiring the assistance and cooperation of federal, state and local governmental agencies. They may be governed by court-ordered or administrative deadlines or requirements. Many of the Authority’s projects also involve impacts on surrounding communities, extensive permitting and concerns for environmental mitigation.

The scope and complexity of many of the Authority’s capital projects makes the timetable and expenditure forecasts for the CIP subject to change. Such factors as future environmental or other legal mandates, as well as traditional construction risks could alter the Authority’s forecasts. In preparing estimates of future revenue requirements for the CIP, the Authority has included inflation assumptions for the purposes of projecting the level of project expenditures when expected to be made or contracted for in accordance with each project’s cash flow projections.

SOURCES AND USES OF CAPITAL FUNDS

The Authority expects to finance its capital expenditures principally from the proceeds of revenue bonds issued under the General Resolution. Certain capital improvements are eligible for federal grants and loans under the Clean Water Act and the SDWA’s revolving fund program. The Authority also plans a gradual increase in the use of current revenues to fund certain capital projects.

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ENVIRONMENTAL REGULATION AND LITIGATION

The Authority's Waterworks System and Sewer System are subject to significant regulation under federal and state environmental laws.

WATER SUPPLY

In the maintenance and expansion of water supply, the Authority is subject to environmental and regulatory oversight chiefly in the areas described below.

Drinking Water Regulation. Under the SDWA, the U.S. Environmental Protection Agency ("EPA") regulates the level of contaminants allowed in drinking water by establishing national drinking water standards so that drinking water will be protected against microbiological or chemical contaminants. Standards include maximum levels, treatment techniques, and other performance standards for contaminants such as coliform bacteria, and lead and copper. Enforcement of drinking water standards in Massachusetts under the SDWA has been delegated to DEP, which also acts under authority of state law and has adopted Massachusetts Drinking Water Standards.

In accordance with SDWA requirements, the Authority eliminated all uncovered distribution storage and, based on annual reviews, DEP continues to find that the Authority's water supply meets federal criteria for unfiltered sources. The Authority undertook a staged compliance schedule for capital improvements to modify treatment processes at the Carroll Water Treatment Plant and the Brutsch Treatment Facility, to meet regulations promulgated in January 2006 under the SDWA that require all unfiltered water systems to have two means of primary disinfection beginning in calendar year 2014. Based on findings from pilot testing and other research, the Authority selected ultraviolet light disinfection ("UV disinfection") for the second means of disinfection as the most sound and cost-effective method. The Authority met the deadlines for implementation of the UV disinfection systems as required under the SDWA.

Under the Lead and Copper Rule, the Authority is required to conduct sampling in conjunction with the Local Bodies to detect the presence of lead in their customers' tap water. Improved corrosion control was implemented in 1996, and lead levels have dropped approximately 90% from initial testing in 1992. Authority system-wide levels in its most recent annual sampling round, conducted in September 2018, were below the lead action level again, as they have been since 2004. The Authority's system also continues to meet the copper standard. Individual Local Bodies whose systems are above the lead action level are required by DEP to conduct lead education and lead service line replacement programs. The Authority expanded its Local Water System Assistance Program to include financial assistance to Local Bodies for the replacement of lead service lines. See "The Systems - The Waterworks System - Water Quality" and "Capital Improvement Program - Capital Projects In FY19 CIP - Waterworks Projects."

Water Resources Management. Pursuant to the State Water Management Act (the "WMA"), water users with surface or ground water withdrawals of more than 100,000 gallons per day must have a WMA Permit or Registration, depending upon whether the withdrawal was existing at the time the WMA was enacted. Under the WMA, the Authority is registered to withdraw 311.9 mgd in the aggregate from the Nashua and Chicopee Rivers. WMA Registrations are renewed every 10 years. In December 2007, DEP, which administers the WMA, issued the Authority its most recent Registration, covering the period 2008 through 2017. The Commonwealth's Permit Extension Act subsequently extended the Registration by four years to 2021. The current Registration maintains the Authority's registered volume of 311.9 mgd. The conditions of the Registration require best management practices that build upon the Authority's existing conservation programs.

Expansion of Water Supplies. While the WMA and other state laws and regulations would govern any substantial structural enlargement of the Authority's water supply system, the Authority does not foresee any circumstances requiring expansion or augmentation of the system. The Authority's current service area water demand is approximately 200 mgd, compared to a safe yield of the Waterworks System of 300 mgd. Accordingly, the Authority believes its current water supply sources are adequate to support the existing Waterworks System's service area, as well as the addition of new member communities as currently contemplated. See "The Systems - The Waterworks System - Extension and Contraction of Waterworks Service Area."

WASTEWATER MANAGEMENT

Sewage Collection, Treatment and Disposal. The Clean Water Act imposes several permit and regulatory requirements on wastewater treatment systems. Public sewage treatment plant owners and operators such as the Authority are required to provide secondary treatment as established by federal regulation for all wastewater discharge from treatment plants into waters of the United States. Under the Clean Water Act, individual states, with EPA concurrence, also establish water quality standards classifying water body uses and pollutant control criteria to protect those uses. All sewage system discharges require NPDES permits specifying applicable technology based requirements, as well as any more stringent controls required to achieve the water quality standards established by the state pursuant to federal regulations. The NPDES permits for the Deer Island Treatment Plant and the Clinton Wastewater Treatment Plant are issued jointly by DEP and EPA. See “NPDES Permits” below. Major wastewater treatment systems also must adopt and enforce pretreatment regulations for industries and other non-domestic sources discharging into sewers. Treatment plants are also subject to the Clean Water Act and state regulations governing sludge use and disposal.

The Clean Water Act is enforced by EPA and DEP through administrative orders and procedures. Violations also may be the basis for federal law suits brought on EPA’s behalf by the United States Department of Justice (the “DOJ”) or by private citizens. DOJ brought such an action against the Authority and others, referred to herein as the Clean Water Act Case, as described below.

NPDES Permits. The Authority operates its sewage system, including the Deer Island Treatment Plant and CSO outfalls, under a NPDES permit (the “DITP Permit”), which became effective in August 2000. The DITP Permit incorporates federal secondary treatment requirements, other technology based requirements, and other limits necessary for discharges to meet water quality standards established by the Commonwealth and approved by EPA. The DITP Permit includes extensive water quality monitoring requirements, a contingency plan (the “Contingency Plan”) to identify and respond to water quality changes that could potentially be related to effluent discharges from the effluent outfall tunnel, and numerous other requirements for pollution prevention, facility best management practices, management of infiltration/inflow, and restrictions on dry day flow.

The quality of wastewater effluent discharged from the Deer Island Treatment Plant is continuously monitored by the Authority to assess compliance with water quality standards and pollutant limits set forth in the DITP Permit. The Deer Island Treatment Plant operates in compliance with the requirements of the DITP Permit. Because of the intermittent operation of CSO treatment facilities and the challenge of providing treatment in rapidly fluctuating flows, excursions from effluent limits applicable to treated CSO discharges under the DITP Permit have occurred, although none to date have resulted in administrative penalties. CSO outfalls that discharge to the Lower Charles River/Charles River Basin and the Alewife Brook/Upper Mystic River currently operate under regulatory variances to the Massachusetts Surface Water Quality Standards. The variances recognize that it is not feasible to fully attain the Class B water quality standard (which prohibits any CSO discharges) currently applicable to these receiving waters. Pursuant to an agreement among the Authority, EPA and DEP, these variances will extend through 2020, at which time the Authority is required to have completed the CSO post-construction monitoring and performance assessment review required under the Clean Water Act Case to verify whether the levels of control required under the CSO Control Plan have been achieved. See “Boston Harbor: Case Water Act Case,” below. The Authority expects that it will seek an extension of the current variances for an additional period of up to five years. In conjunction with the extension request, the Authority also expects to modify its method of assessing water quality in the performance assessment, as requested by EPA and DEP. At or prior to the end of the extended variance period and following completion of the performance assessment, the Authority expects that it will request DEP to reassess the feasibility of attaining the Class B water quality standard in the applicable receiving waters.

The Authority placed on-line in September 2000 the 9.5 mile effluent outfall tunnel at the Deer Island Treatment Plant, which discharges to Massachusetts Bay, and as a result implemented a comprehensive Ambient Monitoring Plan that has been attached to the DITP Permit since that time. The monitoring includes water column, sediment quality, and fish and shellfish, and is overseen by an independent panel of scientists. The results of the monitoring have shown only a localized signature of the outfall discharge, and no adverse impacts to Massachusetts Bay, while Boston Harbor’s ecosystem has rebounded. The Authority proposed revisions and efficiencies to the Ambient Monitoring Plan that were approved by the regulatory agencies in December 2010.

The Authority submitted its renewal application for the DITP Permit in February 2005. The nominal five-year term of the current DITP Permit expired in August 2005. The DITP Permit remains in effect until a succeeding permit becomes final. EPA continues to work on a draft permit but has not yet issued one for the Authority's review with respect to the Deer Island Treatment Plant.

The Authority's current NPDES Permit for the Clinton Wastewater Treatment Plant expires in February 2022. The Authority completed, in advance of the required completion date, the installation of a new testing system required by the permit.

Boston Harbor: Clean Water Act Case. The DOJ, acting at the request of EPA, and certain citizen groups, brought a consolidated action in 1985 in the United States District Court for the District of Massachusetts (the "District Court") against the MDC, the Commonwealth, BWSC and others, captioned *U.S. v. M.D.C. et al.*, No. 85-0489-RGS and referred to in this Official Statement as the Clean Water Act Case. Plaintiffs sued for violations of NPDES permit conditions and certain terms of outstanding administrative orders previously issued by EPA. In connection with the Clean Water Act Case and pursuant to multiple orders of the District Court over a period of almost 30 years, the Authority undertook and completed the Deer Island Treatment Plant Project in 2001 and the construction portion of the projects included in the CSO Control Plan in 2015. The only significant remaining requirement under the Clean Water Act Case, in addition to the filing of biannual compliance reports, is the requirement that the Authority conduct a three-year post-construction monitoring and performance assessment of the CSO Control Plan to verify whether the levels of CSO control included in the CSO Control Plan have been achieved. The Authority commenced the performance assessment in 2018, and is required to submit a report on the results of the assessment to the District Court by December 2020. The Authority is reporting its interim findings to regulatory and watershed stakeholders, as well as to the District Court in its biannual compliance reports. To date, the completion of construction of the projects in the CSO Control Plan has greatly reduced annual CSO discharge activations and volumes to the receiving waters. See "The Systems- The Sewer System – Combined Sewer Overflows; Infiltration and Inflow" and "NPDES Permits," above.

Cross-Harbor Power Cable. The Authority is as a defendant, along with NSTAR Electric Company (formerly known as the Boston Edison Company ("NSTAR")) and its subsidiary Harbor Electric Energy Company ("HEEC"), in a civil action brought in July 2016 (the "Federal Action") by the United States of America, at the request of the United States Army Corps of Engineers (the "Corps"). The Federal Action seeks injunctive relief and civil penalties for alleged violations of the federal Rivers and Harbors Act of 1899 and the Clean Water Act, through violating a permit issued to the defendants in September 1989 (the "1989 permit") that authorized the installation of a submarine electric power cable that runs under the channel beds of the Reserved Channel and Boston Harbor. The Federal Action alleges that the 1989 Permit was violated as a result of HEEC's failure to install the power cable at required depths. The failure of the power cable to be installed at the depths required by the 1989 permit prevented a proposed project involving the deep-draft vessel dredging of Boston Harbor to move forward. The cable provides the primary source of electric power to the Deer Island Treatment Plant. NSTAR designed, constructed and installed the power cable. The power cable is an asset of HEEC, under HEEC's sole control, although the cost of the design, construction and installation was paid for by the Authority as part of the Boston Harbor Project. The Authority consistently has maintained throughout the various discussions and negotiations over the past several years with the U.S. Attorney and the Corps that MWRA had no responsibility for the design, construction or installation of the power cable and therefore has no responsibility for the costs of remediating the 1989 permit violations.

The Federal Action has been stayed by the district court since late Summer 2017 as a result of a May 2017 agreement (the "2017 Agreement") between MWRA and HEEC pursuant to which HEEC has undertaken to design, acquire and install a suitable replacement power cable for MWRA's exclusive use in conveying electric power to the Deer Island Treatment Plant. The estimated cost of the replacement power cable project, as contained in the 2017 Agreement, is \$114 million. The cost of the project is to be paid by MWRA, subject to a \$17.5 million credit that is intended to compensate MWRA for the early decommissioning of the existing power cable, which has been in use since 1990. On the basis of the 2017 Agreement, all of the parties to the Federal Action entered into a stipulation, subsequently entered as an order of the district court in July 2017, which imposes obligations solely upon HEEC to complete the installation of the replacement power cable by December 31, 2019, and to be solely responsible for stipulated penalties for delays in the schedule that are deemed to be within its reasonable control. HEEC began work on the installation of the replacement cable in October 2018, and the Authority understands that the installation is expected to be completed by the December 2019 deadline. Completion of both the installation of the replacement

power cable and decommissioning of the existing power cable will resolve the Corp's claims in the Federal Action. In addition, the timely completion of HEEC's installation of the replacement power cable will resolve the respective cross-claims of HEEC and MWRA against one another in the Federal Action and will relieve MWRA of any obligation to pay any of HEEC's substantial costs incurred over the past decade to accurately locate the existing power cable and protect it from damage during the harbor dredging operations. All claims of all parties to the Federal Action will be dismissed with prejudice upon satisfaction of the terms of dismissal contained in the stipulation and the 2017 Agreement.

The 2017 Agreement does not cap or limit the Authority's liability to pay the actual cost of the replacement power cable, beyond capping MWRA's share of the cost of the decommissioning the existing power cable at \$9.0 million. The actual recoverable costs of the work will be determined at completion of the project, which will allow for final supplementation of a tariff proceeding pending with the Massachusetts Department of Public Utilities ("DPU") that will determine the extent of MWRA's obligations to HEEC. The Authority will pay one-half of the total costs of the project (net of the \$17.5 million credit described above) not later than the time the replacement power cable is placed in service and will pay the balance of such costs over a 30-year period pursuant to the final terms of the tariff.

Other Environmental Litigation and Regulatory Matters. The Authority operates, constructs and maintains the Systems under an extensive legal and regulatory system. In common with most water and wastewater operating agencies, the Authority's operations and improvements for the Systems are subject to numerous environmental legal and regulatory requirements in addition to the SDWA and the Clean Water Act. These include environmental impact assessment requirements under the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA), permitting requirements under various federal and state laws for construction projects, and various requirements affecting the Authority's properties and operations under the Federal Resource Conservation and Recovery Act of 1976, the Federal Comprehensive Environmental Response, Compensation and Liabilities Act of 1980, and other federal and related state laws and regulations regarding the handling, treatment and storage of oil, hazardous materials and other waste, and the federal Clean Air Act and air pollution control requirements. The Authority's activities and projects give rise, from time to time, to legal and regulatory actions brought against the Authority under such federal and state environmental legislation and regulations; there currently are no such actions that would likely have a material adverse effect on the Systems or the Authority's programs.

In addition to program requirements of the Clean Water Act already reflected in the DITP Permit, the Clinton Permit and the Clean Water Act Case, other regulatory requirements under federal and state law may impose additional operating requirements on the Authority. As an example, EPA has promulgated regulations covering the treatment and handling of sewage sludge, which provide aggressive protection of the environment and public health while permitting beneficial sludge reuse. In addition to the federal standards, the Authority's sewage sludge products must comply with regulations applicable in each jurisdiction in which such products are used, including Massachusetts. In January 2018, regulations were adopted by the Massachusetts Department of Agricultural Resources that govern permissible application and distribution of sludge as fertilizer in Massachusetts. These regulations and similar regulations imposed by other states may have implications for the marketing within the Commonwealth and other such states of sludge-based fertilizer. See "THE SYSTEMS – The Sewer System – Residuals Management."

LEGISLATIVE AND OTHER DEVELOPMENTS

From time to time legislation is introduced in the state Legislature proposing to affect the Authority, which has included adding certain capital projects and operational requirements to its responsibilities, increasing the Authority's debt authorization, providing financial assistance for its programs, and requiring it to make payments to other governmental entities in the Commonwealth. The Authority cannot predict whether any such legislative proposals affecting the Authority will be enacted or imposed in the future.

LITIGATION

There is no threatened or pending litigation against or affecting the Authority that, to the knowledge of the Authority, seeks to restrain or enjoin the issuance, sale or delivery of the 2019 Bonds, or to in any way contest or affect the validity of the 2019 Bonds, the General Resolution, or any proceedings of the Authority taken with respect to the issuance or sale of the 2019 Bonds or with respect to the General Resolution, or in any way contesting the existence or powers of the Authority.

The Authority is a defendant in a number of suits arising out of its operations and activities. These actions from time to time include contract claims arising from the Authority's capital projects, as well as personal injury and property damage claims, and claims arising under employment and non-discrimination laws. To the best knowledge of the Authority's General Counsel, no litigation is pending or threatened which, in the opinion of the Authority's General Counsel, if decided adversely to the Authority, would be likely to result, either individually or in the aggregate, in final judgments against the Authority that would materially adversely affect its ability to meet debt service payments on the 2019 Bonds, when due, or its obligations under the General Resolution, or materially adversely affect its financial condition. See also "Environmental Regulation and Litigation."

In addition, due to the nature and scope of the CIP, the substantial number of Authority construction projects may result from time to time in the bringing of material claims for damages in tort or contract against the Authority. While the outcome of such claims cannot be predicted, the Authority believes that it has made adequate provision through insurance, indemnification, performance bonds, construction monitoring, contingencies and reserves, among other measures, to limit its exposure to liability as a result of such claims.

TAX EXEMPTION

Bond Counsel is of the opinion that, under existing law, except as described below, interest on the 2019 Bonds is not included in gross income for federal income tax purposes, and is not an item of tax preference for the purpose of computing the alternative minimum tax imposed on individuals under the Internal Revenue Code of 1986, as amended (the "Code"). See Appendix D - "Proposed Form of Opinion of Bond Counsel."

The Code imposes certain requirements and restrictions on the use and investment of proceeds of state and local governmental obligations, including the 2019 Bonds, and a requirement for payment to the federal government (called a "rebate") of certain proceeds derived from the investment thereof. Failure to comply with the Code's requirements subsequent to the issuance of the 2019 Bonds could cause interest on the 2019 Bonds to become subject to federal income taxation, and such inclusion could be retroactive to the date of their issuance. On or before delivery of the 2019 Bonds to the original purchasers, the Authority will provide covenants or certificates evidencing that it will take all lawful action necessary to comply with those provisions of the Code that, except for such compliance, would affect adversely the excludability of interest on the 2019 Bonds from gross income for federal income tax purposes. Bond Counsel has not opined as to the other federal tax consequences resulting from holding the 2019 Bonds.

Interest paid on tax-exempt obligations such as the 2019 Bonds is now generally required to be reported by payors to the Internal Revenue Service ("IRS") and to recipients in the same manner as interest on taxable obligations. In addition, such interest may be subject to "backup withholding" if the owner of such 2019 Bond fails to provide the information required in IRS Form W-9, Request for Taxpayer Identification Number and Certification, or the IRS has specifically identified said owner as being subject to backup withholding because of prior underreporting. Neither the information reporting requirement nor the backup withholding requirement affects the excludability of interest on the 2019 Bonds from gross income for federal tax purposes.

In the opinion of Bond Counsel, the 2019 Bonds, their transfer and the income therefrom, including any profit made on the sale thereof, are exempt from Massachusetts personal income taxes and the 2019 Bonds are exempt from Massachusetts personal property tax, although the 2019 Bonds and the interest thereon are included in the measure of estate and inheritance taxes and of certain corporation excise and franchise taxes. Bond Counsel has not opined as to other Massachusetts tax consequences or as to the taxability of the 2019 Bonds, their transfer and the income therefrom, including any profit made on the sale thereof, under the laws of jurisdictions other than the Commonwealth.

For federal and Massachusetts tax purposes, interest includes original issue discount. Original issue discount with respect to a 2019 Bond is equal to the excess, if any, of the stated redemption price at maturity of such 2019 Bond over the initial offering price thereof to the public, excluding underwriters and other intermediaries, at which price a substantial amount of the 2019 Bonds with the same maturity were sold (such 2019 Bond constituting an “OID Bond”). Original issue discount accrues actuarially over the term of an OID Bond, with the accruing original issue discount being added to the adjusted basis of such OID Bond to determine taxable gain or loss upon disposition (including sale, redemption or payment upon maturity) of such OID Bond.

In general, if an owner acquires a 2019 Bond for a purchase price (excluding accrued interest) or otherwise at a tax basis that reflects a premium over the sum of all amounts payable on such 2019 Bond after the acquisition date (excluding certain “qualified stated interest” that is unconditionally payable at least annually at prescribed rates), such 2019 Bond (a “Premium Bond”) will have bond premium. In general, for federal and Massachusetts tax purposes, an owner of a Premium Bond must amortize the bond premium over the remaining term of the Premium Bond, based on the owner’s yield over the remaining term of the Premium Bond determined on the basis of constant yield principles. An owner of a Premium Bond must amortize the bond premium by offsetting the qualified stated interest allocable to each interest accrual period, under the owner’s regular method of accounting, against the bond premium allocable to that period. In the case of a tax-exempt bond, such as a 2019 Bond, that is a Premium Bond, if the bond premium allocable to an accrual period exceeds the qualified stated interest allocable to that accrual period, the excess is a nondeductible loss. Under certain circumstances, the owner of a Premium Bond may realize a taxable gain upon disposition of the Premium Bond even though it is sold or redeemed for an amount less than or equal to the owner’s original acquisition cost.

The federal and state tax opinions of Bond Counsel with respect to the 2019 Bonds are described above. It should be noted that the ownership or disposition of, or the accrual or receipt of interest on, the 2019 Bonds may otherwise affect the federal or state tax liability of owners of the 2019 Bonds. The nature and extent of these other tax consequences will depend upon the particular tax status of the owners of the 2019 Bonds or such owners’ other items of income or deduction. Bond Counsel expresses no opinion regarding any such other tax consequences, and such owners should consult with their own tax advisors with respect to such consequences.

Any federal, state or local legislation, administrative pronouncement or court decision (any such legislation, administrative pronouncement or court decision constituting a “Governmental Action”) may affect (i) the tax status (whether or not discussed herein or addressed in the opinion of Bond Counsel) of the 2019 Bonds (including without limitation any exemption under applicable federal, state or local law from otherwise applicable taxes with respect to the (a) interest on the 2019 Bonds, (b) gain from the sale or other disposition of the 2019 Bonds, or (c) value of the 2019 Bonds), or (ii) the market price or marketability of the 2019 Bonds.

The impact of any Governmental Action cannot be predicted. Owners of the 2019 Bonds are encouraged to consult their personal or institutional tax and financial advisors with respect to the tax and financial aspects of ownership of the 2019 Bonds.

On the date of delivery of the 2019 Bonds, Bond Counsel will issue an opinion substantially in the form attached hereto as Appendix D – “Proposed Form of Opinion of Bond Counsel.”

FINANCIAL ADVISOR

PFM Financial Advisors LLC (“PFM”) serves as financial advisor to the Authority for debt management and other financial matters. PFM has acted as independent financial advisor to the Authority with respect to the 2019 Bonds. PFM is not obligated to undertake, and has not undertaken, either to make an independent verification of or to assume responsibility for, the accuracy, completeness, or fairness of the information contained in this Official Statement and the appendices hereto. PFM is an independent financial advisory firm and is not engaged in the business of underwriting, trading or distributing securities.

FINANCIAL STATEMENTS

CliftonLarsenAllen LLP, the Authority's independent auditor, has not been engaged to perform and has not performed, since the date of its report referenced therein, any procedures on the financial statements of the Authority as of June 30, 2018 and 2017, and for the Fiscal Years then ended, included in Appendix A to this Official Statement. CliftonLarsenAllen LLP also has not performed any procedures relating to this Official Statement or the 2019 Bonds.

CONSULTING ENGINEER

CDM Smith Inc. serves as the Authority's engineering consultant. The Consulting Engineer's Triennial Report provides an independent engineering analysis of the Authority's Systems and a financial feasibility analysis of the Authority's current operations and CIP. The most recent triennial report, the 2017 Triennial Report, was completed in October 2017 and is available through EMMA. See "Financial Operations - Reports." Attached hereto as Appendix B is the April 2019 Report of the Consulting Engineer relating to certain financial matters and projections of the Authority, including the Authority's estimated future rates and charges through Fiscal Year 2024.

CERTAIN LEGAL MATTERS

All legal matters incident to the authorization, issuance, sale and delivery of the 2019 Bonds are subject to the approval of McCarter & English, LLP, Boston, Massachusetts, Bond Counsel to the Authority. Certain legal matters will be passed upon for the Authority by its Disclosure Counsel, Greenberg Traurig, LLP, Boston, Massachusetts and for the Underwriters by their counsel, Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts.

RATINGS

The 2019 Bonds have been rated "AA+" by Fitch Ratings, Inc. ("Fitch"), 33 Whitehall Street, New York, New York, "Aa1" by Moody's Investors Service, Inc. ("Moody's"), 7 World Trade Center, New York, New York and "AA+" by S&P Global Ratings ("Standard & Poor's"), a division of Standard & Poor's Financial Services LLC, 55 Water Street, New York, New York.

The ratings express only the views of the rating agencies. The explanation of the significance of the ratings may be obtained from Fitch, Moody's and Standard & Poor's, respectively. There is no assurance that any rating will continue for any period of time or that it will not be revised or withdrawn. Any revision or withdrawal of ratings on the 2019 Bonds may have an effect on the market price thereof.

VERIFICATION OF MATHEMATICAL COMPUTATIONS

The arithmetical accuracy of certain computations included in the schedules provided by Morgan Stanley & Co. LLC ("Morgan Stanley") relating to (i) computation of anticipated receipts of principal and interest on the Defeasance Obligations and the anticipated payments of principal and interest to redeem the Refunded Bonds, and (ii) computation of the yields on the 2019 Bonds and the Defeasance Obligations was examined by The Arbitrage Group, Inc. Such computations were based solely upon assumptions and information supplied by Morgan Stanley. The Arbitrage Group, Inc. restricted its procedures to examining the arithmetical accuracy of certain computations and has not made any study or evaluation of the assumptions and information upon which the computations are based and, accordingly, has not expressed an opinion on the data used, the reasonableness of the assumptions, or the achievability of future events.

UNDERWRITING

The Underwriters, for whom Morgan Stanley is serving as representative (the "Representative"), have agreed, subject to certain conditions set forth in a bond purchase agreement to be entered into by the Authority and the Representative, to purchase from the Authority the 2019 Bonds at an aggregate price of \$175,017,023.16, representing the par amount of the 2019 Bonds, plus original issue premium of \$31,293,545.65, less an Underwriters' discount of \$466,522.49. The Underwriters will be obligated to purchase all 2019 Bonds if any such

2019 Bonds are purchased. The Underwriters may offer and sell the 2019 Bonds to certain dealers and others (including dealers depositing 2019 Bonds into investment trusts) at prices lower than the public offering prices (or yields higher than the offering yields) stated on the inside cover page hereof. The principal offering prices (or yields) set forth on the inside cover page hereof may be changed from time to time after the initial offering by the Underwriters. The obligation of the Underwriters to accept delivery of the 2019 Bonds is subject to the terms and conditions set forth in the bond purchase agreement, the approval of legal matters by counsel and other conditions.

Certain of the Underwriters have entered into distribution agreements with other broker-dealers (some of which may not have been designated by the Authority as Underwriters) for the distribution of the 2019 Bonds at the original issue prices. Such agreements generally provide that the relevant Underwriter will share a portion of its underwriting compensation or selling concession with such broker-dealers.

The Underwriters and their respective affiliates are full service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, principal investment, hedging, financing and brokerage services. Certain of the Underwriters and their respective affiliates have, from time to time, performed, and may in the future perform, various financial advisory and investment banking services for the Authority, for which they received or will receive customary fees and expenses.

In the ordinary course of their various business activities, the Underwriters and their respective affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities, which may include credit default swaps) and financial instruments (including bank loans) for their own account and for the accounts of their customers and may at any time hold long and short positions in such securities and instruments. Such investment and securities activities may involve securities and instruments of the Authority.

The Underwriters and their respective affiliates may also communicate independent investment recommendations, market color or trading ideas and/or public or express independent research views in respect to such assets, securities or instruments and may at any time hold, or recommend to clients that they should acquire, long and/or short positions in such assets, securities and instruments.

The current business of Merrill Lynch, Pierce, Fenner & Smith Incorporated (“Merrill Lynch”), one of the Underwriters of the 2019 Bonds, is being reorganized into two affiliated broker-dealers (i.e., Merrill Lynch, Pierce, Fenner & Smith Incorporated and BofA Securities, Inc.) in which BofA Securities, Inc. will be the new legal entity for the institutional services that are now provided by Merrill Lynch. This transfer is expected to occur on May 13, 2019 (the “Transfer Date”). Merrill Lynch, as an Underwriter of the 2019 Bonds, is expected to assign its rights and obligations as an Underwriter of the 2019 Bonds to BofA Securities, Inc., as the settlement date for the 2019 Bonds is expected to occur after the Transfer Date.

Wells Fargo Securities, one of the Underwriters of the 2019 Bonds, is the trade name for certain securities-related capital markets and investment banking services of Wells Fargo & Company and its subsidiaries, including Wells Fargo Bank, National Association, which conducts its municipal securities sales, trading and underwriting operations through the Wells Fargo Bank, NA Municipal Products Group, a separately identifiable department of Wells Fargo Bank, National Association, registered with the Securities and Exchange Commission as a municipal securities dealer pursuant to Section 15B(a) of the Securities Exchange Act of 1934.

CONTINUING DISCLOSURE

General. The Authority has undertaken for the benefit of the owners of the 2019 Bonds to provide certain continuing disclosure pursuant to the provision of Rule 15c2-12(b)(5) under the Securities Exchange Act of 1934 (as amended, the “Rule”). Specifically, the Authority and State Street Bank and Trust Company, predecessor in interest to U.S. Bank National Association, as Dissemination Agent (the “Dissemination Agent”) have executed and delivered a Continuing Disclosure Agreement dated November 21, 1995 (the “CDA”), which has been previously supplemented, including by a supplement dated as of May 22, 2019 (the “2019 Supplement”) (as so supplemented, the “Continuing Disclosure Agreement”), being executed in connection with the issuance of the 2019 Bonds, for the benefit of the owners of all bonds (including the 2019 Bonds) issued by or on behalf of the Authority that are designated by resolution of the Authority as subject to and having the benefits of the Continuing Disclosure

Agreement. For the prior five years, the Authority has complied in all material respects with the terms of the Continuing Disclosure Agreement, except that notices regarding changes in ratings of certain Subordinated Bonds were not filed with respect to short-term rating changes on such Subordinated Bonds due to changes in the rating of the applicable liquidity providers.

Annual Filings. Pursuant to the Continuing Disclosure Agreement, not later than January 1 of each year, commencing January 1, 1998, the Authority will, or will cause the Dissemination Agent to, provide an Annual Filing (as described below) to each nationally recognized municipal securities information repository (the “National Repositories”), which currently consists of the Municipal Securities Rulemaking Board (the “MSRB”) through EMMA, and any public or private repository or entity designated by the Commonwealth as a state information depository for the purpose of the Rule (a “State Depository” and, collectively with the National Repositories, the “Repositories”). The Annual Filing may be submitted as a single document or as separate documents comprising a package, and may cross-reference other information as provided in the Continuing Disclosure Agreement. If the Dissemination Agent determines that the Authority has failed to comply with the undertaking regarding the Annual Filing, the Dissemination Agent will send a notice to that effect in a timely manner to the MSRB and the State Depository, if any.

The Authority’s Annual Filing will contain or incorporate by reference the following:

(a) quantitative information for, or as of the end of, the preceding Fiscal Year of the type presented in the Authority’s most recent official statement, including (i) a summary table of revenues, expenses and fund deposits, (ii) the amount of outstanding indebtedness of the Authority, and the debt limit as of the end of the Fiscal Year, (iii) a summary table with respect to the coverage covenants in the Authority’s General Resolution, and (iv) a summary table showing the Authority’s capital investments by major category during the preceding Fiscal Year;

(b) quantitative information for the current Fiscal Year of the type presented in the Authority’s most recent official statement, including (i) a table of the Authority’s current water and wastewater charges by Local Body, (ii) the current expense budget’s rate revenue requirement and the percentage increases for water and wastewater over the prior Fiscal Year, and (iii) executive summaries of the Authority’s most recently adopted current expense budget and capital improvement program; and

(c) the most recently available audited financial statements of the Authority, prepared in accordance with accounting principles generally accepted in the United States of America. (If audited financial statements for the preceding Fiscal Year are not available when the Annual Filing is submitted, the Annual Filing will include unaudited financial statements for the preceding Fiscal Year.)

Any or all of the items listed above may be incorporated by reference from other documents, including official statements of debt issues of the Authority or related public entities, which have been submitted to each of the Repositories or the Securities and Exchange Commission. If the document incorporated by reference is a final official statement, it must be available from the MSRB.

Reporting of Listed Events. Pursuant to the Continuing Disclosure Agreement, whenever the Authority obtains knowledge of the occurrence of any of the following events with respect to the 2019 Bonds (each a “Listed Event”), the Authority will promptly notify the Dissemination Agent. The Dissemination Agent shall file a notice of such occurrence in a timely manner not in excess of ten business days after the occurrence of the event with the MSRB and the State Depository, if any.

1. Principal and interest payment delinquencies.
2. Non-payment related defaults, if material.
3. Unscheduled draws on debt service reserves reflecting financial difficulties.
4. Unscheduled draws on credit enhancements reflecting financial difficulties.

5. Substitution of credit or liquidity providers, or their failure to perform.
6. Receipt by the Authority of an adverse tax opinion, the issuance by the IRS of proposed or final determinations of taxability, Notices of Proposed Issue (IRS Form 5701-TEB) or other material notices or determinations with respect to the tax status of the 2019 Bonds, or the occurrence of other material events affecting the tax status of the 2019 Bonds.
7. Modifications to rights of any owners of the 2019 Bonds, if material.
8. Bond calls, if material, and tender offers.
9. Defeasance of the 2019 Bonds or any portion thereof.
10. Release, substitution or sale of property securing repayment of any 2019 Bonds, if material.
11. Rating changes.
12. Bankruptcy, insolvency, receivership or similar proceeding of the Authority.¹
13. The consummation of a merger, consolidation or acquisition involving the Authority or the sale of substantially all of the assets of the Authority, other than in the ordinary course of business, the entry into a definitive agreement to undertake such action or the termination of a definitive agreement relating to any such actions, other than pursuant to its terms, if material.
14. The appointment of a successor or additional trustee, or the change of name of a trustee, if material.
15. The incurrence of a financial obligation of the Authority, if material, or agreement to covenants, events of default, remedies, priority rights, or other similar terms of a financial obligation of the Authority, any of which affect Bondowners, if material.²
16. A default, event of acceleration, termination event, modification of terms, or other similar events under the terms of a financial obligation of the Authority, any of which reflect financial difficulties.²

Termination of Reporting Obligation. The Authority's and Dissemination Agent's obligations under the Continuing Disclosure Agreement will terminate upon the defeasance, prior redemption or payment in full of all of the bonds (including the 2019 Bonds) designated as subject to the agreement.

¹ For the purposes of the event identified in item 12, the event is considered to occur when any of the following occur: The appointment of a receiver, fiscal agent or similar officer for an obligated person in a proceeding under the U.S. Bankruptcy Code or in any other proceeding under state or federal law in which a court or governmental authority has assumed jurisdiction over substantially all of the assets or business of the obligated person, or if such jurisdiction has been assumed by leaving the existing governing body and officials or officers in possession but subject to the supervision and orders of a court or governmental authority, or the entry of an order confirming a plan of reorganization, arrangement or liquidation by a court or governmental authority having supervision or jurisdiction over substantially all of the assets or business of the obligated person.

² For purposes of the events identified as items 15 and 16 above, the term "financial obligation" means a (i) debt obligation; (ii) derivative instrument entered into in connection with, or pledged as security or a source of payment for, an existing or planned debt obligation; or (iii) guarantee of (i) or (ii). The term "financial obligation" shall not include municipal securities as to which a final official statement has been provided to the MSRB consistent with the Rule.

Amendment; Waiver. Notwithstanding any other provision of the Continuing Disclosure Agreement, the Authority and the Dissemination Agent may amend the Continuing Disclosure Agreement, and any provision of the Continuing Disclosure Agreement may be waived, if such amendment or waiver is permitted by the Rule, as evidenced by an opinion of counsel expert in federal securities laws, acceptable to both the Authority and the Dissemination Agent, to the effect that such amendment or waiver would not, in and of itself, cause the Authority's undertakings to violate the Rule if such amendment or waiver had been effective on the date of the 2019 Supplement but taking into account any subsequent change in or official interpretation of the Rule.

If the amendment provides for a change in the accounting principles to be followed in preparing financial statements, the Annual Filing for the year in which the change is made shall present a comparison between the financial statements or information prepared on the basis of the new accounting principles and those prepared on the basis of the former accounting principles. The comparison shall include a qualitative discussion of the differences in the accounting principles and the impact of the change in the accounting principles on the presentation of the financial information in order to provide information to investors to enable them to evaluate the ability of the Authority to meet its obligations. To the extent reasonably feasible, the comparison shall also be quantitative. A notice of the change in the accounting principles shall be sent to each Repository.

Default. In the event of a failure of the Authority or the Dissemination Agent to comply with any provision of the Continuing Disclosure Agreement, the Dissemination Agent may (and, at the request of any of the Underwriters or the owners of at least 25% aggregate principal amount outstanding of the 2019 Bonds, shall), or any owner of the 2019 Bonds may, seek a court order for specific performance by the Authority or Dissemination Agent, as the case may be, of its obligations under the Continuing Disclosure Agreement. A default under the Continuing Disclosure Agreement shall not be deemed an Event of Default under the General Resolution, and the sole remedy under the Continuing Disclosure Agreement in the event of any failure of the Authority or the Dissemination Agent to comply with the Continuing Disclosure Agreement shall be an action to compel performance of the defaulting party's obligations thereunder and not for money damages in any amount.

BONDS AS LEGAL INVESTMENTS

Under Section 14 of the Act, bonds and notes of the Authority are made securities in which all public officers and agencies of the Commonwealth and its political subdivisions, all insurance companies, trust companies in their commercial departments, savings banks, cooperative banks, banking associations, investment companies, executors, administrators, trustees and other fiduciaries may properly invest funds, including capital in their control or belonging to them.

BONDS AS SECURITY FOR DEPOSIT

Under Section 14 of the Act, bonds and notes of the Authority are made securities that may properly be deposited with and received by any state or municipal officer of any agency or political subdivision of the Commonwealth for any purpose for which the deposit of bonds or other obligations of the Commonwealth is now or may hereafter be authorized by law.

MISCELLANEOUS

The summaries or descriptions herein of provisions of the Act, the 2019 Bonds, the General Resolution and the Continuing Disclosure Agreement, and all references to other materials not purporting to be quoted in full, are only brief outlines of some of the provisions thereof and do not purport to summarize or describe all of the provisions thereof. So far as any statements are made in this Official Statement involving matters of opinion, whether or not expressly so stated, they are intended merely as such and not as representations of fact. Copies of the documents mentioned in this paragraph are on file at the offices of the Authority and the Trustee.

The execution and delivery of this Official Statement have been duly authorized by the Massachusetts Water Resources Authority.

MASSACHUSETTS WATER RESOURCES AUTHORITY

By: /s/ Frederick A. Laskey
Executive Director

By: /s/ Thomas J. Durkin
Director of Finance

May 8, 2019

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MASSACHUSETTS WATER RESOURCES AUTHORITY

Financial Statements and Supplemental Schedules
and Required Supplementary Information

June 30, 2018 and 2017

(With Independent Auditors' Report Thereon)

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MASSACHUSETTS WATER RESOURCES AUTHORITY

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The Board of Directors
Massachusetts Water Resources Authority
Boston, Massachusetts

Report on the Financial Statements

We have audited the accompanying statements of net position of the Massachusetts Water Resources Authority (the Authority) as of June 30, 2018 and 2017, and the related statements of revenues, expenses and changes in net position and cash flows for the years then ended, and the related notes to the financial statements.

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.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits 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 financial position of the Authority as of June 30, 2018 and 2017, and the changes in financial position and cash flows for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Emphasis of Matter

During the fiscal year ended June 30, 2018, the Authority adopted GASB Statement No. 75, *Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions*. As a result, the Authority reported a restatement for a change in accounting principle. Our auditors' opinion was not modified with respect to the restatement.

Other Matters

Required Supplementary Information

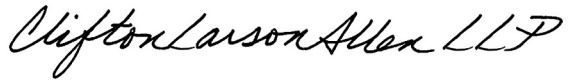
Accounting principles generally accepted in the United States of America require that the management's discussion and analysis (located on pages 4 through 11) and certain pension and other post-employment benefits information (located on pages 55 through 59) be presented to supplement the basic financial 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.

Supplementary and Other Information

Our audit was conducted for the purpose of forming an opinion on the Authority's financial statements. The schedule of Accounts Established by the General Revenue Bond Resolution, Combining Statements of Net Position and Combining Statements of Revenues, Expenses and Changes in Net Position (Supplemental Schedules) are presented for purposes of additional analysis and are not a required part of the basic financial statements. The Supplemental Schedules are the responsibility of management and were derived from and relate 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 Supplemental Schedules are fairly stated, in all material respects, in relation to the basic financial statements as a whole.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated August 31, 2018 on our consideration of the Authority'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 Authority'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 Authority's internal control over financial reporting and compliance.

A handwritten signature in cursive script that reads "CliftonLarsonAllen LLP".

CliftonLarsonAllen LLP

Boston, Massachusetts
August 31, 2018

MASSACHUSETTS WATER RESOURCES AUTHORITY

Management's Discussion and Analysis – Required Supplementary Information

June 30, 2018 and 2017

(Unaudited)

This section of the Authority's annual financial report presents our discussion and analysis of the Authority's financial performance during the fiscal years ended June 30, 2018 and 2017. Please read it in conjunction with the Authority's financial statements, which immediately follow this section.

Financial Highlights – Fiscal Year 2018

The fiscal year 2018 customer service revenues were approximately \$728.3 million. Of this amount, rate revenues represent approximately 98.5%, or \$717.1 million, and were \$22.2 million higher than fiscal year 2017. This was due to an increase in assessments.

Total operating expenses, excluding depreciation, were approximately \$277.9 million in fiscal year 2018. The 2.9% decrease in total operating expenses over fiscal year 2017 is the result of decreases in pension and pollution remediation expenses totaling \$10.3 million, and a decrease in maintenance costs of \$1.7 million, offset by increases in personnel costs of \$2 million and utility costs of \$1.7 million.

Net nonoperating expenses decreased \$16 million, or 7.4%, primarily due to a \$14.5 million decrease in interest expense. Interest expense decreased due to a combination of principal repayments and refunding/defeasance of outstanding debt.

Total assets at June 30, 2018 were approximately \$7.5 billion, a \$160.2 million, or 2.1%, decrease over total assets at June 30, 2017.

During fiscal year 2018 the Authority issued direct-purchase General Revenue Refunding Bonds, 2018 Series A for \$50.6 million, General Revenue Bonds, 2018 Series B for \$107.6 million, General Revenue Refunding Bonds, 2018 Series C for \$21.9 million and direct-purchase General Revenue Refunding Bonds, 2018 Series D for \$50 million. The proceeds from these bonds were used to retire commercial paper notes, retire a portion of the revolving loan, refund bonds outstanding and finance new construction projects. The interest rate on these bonds range from 3% to 5%.

Total capital assets (net of depreciation) were approximately \$5.9 billion at June 30, 2018, an \$75.1 million, or 1.2%, decrease over June 30, 2017. The decrease was primarily due to the rate of depreciation being higher than the rate of capitalization.

Financial Highlights – Fiscal Year 2017

The fiscal year 2017 customer service revenues were approximately \$705.9 million. Of this amount, rate revenues represent approximately 98.4%, or \$694.9 million, and were \$22.4 million higher than fiscal year 2016. This was due to an increase in assessments.

Total operating expenses, excluding depreciation, were approximately \$286.3 million in fiscal year 2017. The 5.2% increase in total operating expenses over fiscal year 2016 is the result of increases in pension and pollution remediation expenses totaling \$11.8 million and an increase in watershed reimbursement costs of \$2 million, offset by a decrease in OPEB expenses of \$3.2 million.

Net nonoperating expenses increased \$10 million, or 4.9%, due to a \$16.2 million decrease in investment income and a decrease in debt service assistance receipts of \$0.5 million offset by a \$6.6 million decrease in interest expense. The decrease in investment income was primarily due to a decrease in the unrealized gain on investments.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Management's Discussion and Analysis – Required Supplementary Information

June 30, 2018 and 2017

(Unaudited)

Higher long-term interest rates have caused the market values of investments to decrease. Interest expense decreased due to a combination of principal repayments and refunding/defeasance of outstanding debt.

Total assets at June 30, 2017 were approximately \$7.6 billion, a \$150.7 million, or 1.9%, decrease over total assets at June 30, 2016.

During fiscal year 2017, the Authority issued General Revenue Bonds, 2017 Series B and General Revenue Refunding Bonds, 2017 Series C for a total of \$323 million. The proceeds from these bonds were used to finance new capital projects and refund \$306.2 million of the Authority's outstanding bonds. The interest rates on these bonds range from 4% to 5%.

During fiscal year 2017, the Authority also issued General Revenue Refunding Bonds, 2016 Series D for \$104.3 million. The proceeds from these bonds were used to refund \$102.5 million of the Authority's outstanding bonds. The interest rates on these bonds range from 3% to 5%.

Total capital assets (net of depreciation) were approximately \$6.0 billion at June 30, 2017, an \$84.7 million, or 1.4%, decrease over June 30, 2016. The decrease was primarily due to the rate of depreciation being higher than the rate of capitalization.

Overview of the Financial Statements

The financial section of this annual report consists of four parts: management's discussion and analysis (this section), the financial statements and related notes to the financial statements, required supplementary information, and other supplementary information.

The financial statements provide both long-term and short-term information about the Authority's overall financial status. The financial statements also include notes that explain some of the information in the financial statements and provide more detailed data. The statements are followed by a section of required supplementary information and other supplementary information that further explains and supports the information in the financial statements.

Financial Analysis of the Authority

Net Position

The Authority's total net position at June 30, 2018 was approximately \$1.6 billion, a \$60.9 million decrease from June 30, 2017. Total assets decreased \$160.2 million, or 2.1%, to \$7.5 billion, and total liabilities decreased \$168.2 million, or 2.8%, to \$5.9 billion.

The Authority's total net position at June 30, 2017 was approximately \$1.67 billion, a \$37.8 million decrease from June 30, 2016. Total assets decreased \$150.7 million, or 1.9%, to \$7.6 billion, and total liabilities decreased \$139.4 million, or 2.2%, to \$6.1 billion.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Management's Discussion and Analysis – Required Supplementary Information

June 30, 2018 and 2017

(Unaudited)

Net Position

(Dollars in thousands)

	2018	2017*	2016*	Percentage change 2018–2017	Percentage change 2017–2016
Current assets	\$ 95,963	\$ 93,210	\$ 94,763	3.0%	(1.6%)
Restricted assets	727,104	707,255	691,843	2.8%	2.2
Capital assets	5,948,350	6,023,414	6,108,090	(1.2%)	(1.4)
Other assets	716,378	824,142	903,998	(13.1%)	(8.8)
Total assets	7,487,795	7,648,021	7,798,694	(2.1%)	(1.9)
Deferred outflows of resources from pension	17,154	47,910	39,153	(64.2%)	22.4
Deferred outflows of resources from derivative instruments	20,988	35,755	59,615	(41.3%)	(40.0)
Deferred outflows of resources from refunded debt	47,597	68,344	94,840	(30.4%)	(27.9)
Current liabilities	350,382	349,139	282,777	0.4%	23.5
Payable from restricted assets	157,721	154,597	148,191	2.0%	4.3
Long-term debt	5,192,316	5,337,619	5,545,040	(2.7%)	(3.7)
Long-term lease	27,219	28,261	29,223	(3.7%)	(3.3)
Other liabilities	172,784	199,032	202,770	(13.2%)	(1.8)
Total liabilities	5,900,422	6,068,648	6,208,001	(2.8%)	(2.2)
Deferred inflows of resources from pension	14,963	11,810	5,586	26.7%	111.4
Deferred inflows of resources from OPEB	10,032	-	-	100.0%	-
Deferred inflows of resources from regulated activities	42,718	53,275	74,606	(19.8%)	(28.6)
Net position:					
Net investment in capital assets	759,757	729,903	679,739	4.1%	7.4
Restricted	357,767	339,073	346,366	5.5%	(2.1)
Unrestricted	487,875	597,321	678,004	(18.3%)	(11.9)
Total net position	\$ 1,605,399	\$ 1,666,297	\$ 1,704,109	(3.7%)	(2.2%)

*Certain amounts were reclassified to conform to the fiscal year 2018 presentation

MASSACHUSETTS WATER RESOURCES AUTHORITY

Management's Discussion and Analysis – Required Supplementary Information

June 30, 2018 and 2017

(Unaudited)

Changes in Net Position

The decrease in net position (including the restatement to comply with GASB 75) at June 30, 2018 was \$60.9 million, or 3.7%, as compared with June 30, 2017. The Authority's total operating revenues increased by 3.0% to \$738.3 million and total operating expenses decreased 2.9% to \$277.9 million.

The decrease in net position at June 30, 2017 was \$37.8 million, or 2.2%, as compared with June 30, 2016. The Authority's total operating revenues increased by 2.8% to \$716.8 million and total operating expenses increased 5.2% to \$286.3 million.

Changes in Net Position					
(Dollars in thousands)					
	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>Percentage change 2018–2017</u>	<u>Percentage change 2017–2016</u>
Operating revenues:					
Customer service revenues	\$ 728,281	\$ 705,933	\$ 683,501	3.2%	3.3%
Other revenues	10,023	10,843	13,472	(7.6)	(19.5)
Total operating revenues	<u>738,304</u>	<u>716,776</u>	<u>696,973</u>	<u>3.0</u>	<u>2.8</u>
Operating expenses:					
Operations	106,943	106,844	98,972	0.1	8.0
Maintenance	29,067	30,799	30,978	(5.6)	(0.6)
Payments in lieu of taxes	8,220	8,191	8,129	0.4	0.8
Engineering, general, and administrative	133,627	140,435	133,959	(4.8)	4.8
Total operating expenses	<u>277,857</u>	<u>286,269</u>	<u>272,038</u>	<u>(2.9)</u>	<u>5.2</u>
Depreciation and amortization	<u>202,799</u>	<u>201,481</u>	<u>197,128</u>	<u>0.7</u>	<u>2.2</u>
Operating income	<u>257,648</u>	<u>229,026</u>	<u>227,807</u>	<u>12.5</u>	<u>0.5</u>
Nonoperating items:					
Regulatory accounting provisions	(106,777)	(62,714)	(72,162)	70.3	(13.1)
Net nonoperating expenses	(198,327)	(214,288)	(204,259)	(7.4)	4.9
Capital grants and contributions	4,715	7,224	38,190	(34.7)	(81.1)
Changes in derivative related accounts	2,940	2,940	2,940	-	-
Total nonoperating items	<u>(297,449)</u>	<u>(266,838)</u>	<u>(235,291)</u>	<u>11.5</u>	<u>13.4</u>
Change in net position	(39,801)	(37,812)	(7,484)	5.3	405.2
Total net position – beginning of year	1,666,297	1,704,109	1,711,593	(2.2)	(0.4)
Restatement to comply with GASB 75	<u>(21,097)</u>	<u>-</u>	<u>-</u>	<u>(100.0)</u>	<u>-</u>
Total net position – end of year	<u>\$ 1,605,399</u>	<u>\$ 1,666,297</u>	<u>\$ 1,704,109</u>	<u>(3.7%)</u>	<u>(2.2%)</u>

During fiscal year 2018, the increases in customer service revenues were primarily due to the 3.19% increase in the rate revenue requirement (\$22.2 million).

MASSACHUSETTS WATER RESOURCES AUTHORITY

Management's Discussion and Analysis – Required Supplementary Information

June 30, 2018 and 2017

(Unaudited)

During fiscal year 2017, the increases in customer service revenues were primarily due to the 3.34% increase in the rate revenue requirement (\$22.4 million).

Operating Costs by Functionality

(Dollars in thousands)

	2018	2017	2016	Percentage change 2018–2017	Percentage change 2017–2016
Wastewater treatment and transport	\$ 98,070	\$ 95,636	\$ 96,427	2.5%	(0.8%)
Water treatment and transport	37,144	37,110	35,630	0.1	4.2
Water and wastewater quality	9,600	9,068	8,767	5.9	3.4
Metering and monitoring	5,059	5,079	4,980	(0.4)	2.0
Facilities planning, design, and construction	11,515	11,188	9,753	2.9	14.7
Management information systems	11,785	11,991	10,346	(1.7)	15.9
Administration and support	46,516	50,650	50,145	(8.2)	1.0
Total direct operating costs	<u>219,689</u>	<u>220,722</u>	<u>216,048</u>	<u>(0.5)</u>	<u>2.2</u>
Indirect operating costs	<u>58,168</u>	<u>65,547</u>	<u>55,990</u>	<u>(11.3)</u>	<u>17.1</u>
 Total operating costs	 <u>\$ 277,857</u>	 <u>\$ 286,269</u>	 <u>\$ 272,038</u>	 <u>(2.9%)</u>	 <u>5.2%</u>

Increases in wastewater treatment and transport expenses were due primarily to \$1.75 million increase in electricity costs at Deer Island and a \$0.67 million increase in sludge pelletization costs of the Residuals Operations department.

Other Post-Employment Benefits (OPEB) Irrevocable Trust

In April 2015, the Authority established the MWRA Other Post-Employment Benefits (OPEB) Irrevocable Trust. The Trust was established for the sole purpose of providing for the advance funding of future costs of retired employee health insurance and other benefits provided to retirees. It is intended that the Trust shall constitute a “Qualified OPEB Trust” according to the standards set forth in GASB Statement No. 45, *Accounting and Financial Reporting by Employers for Postemployment Benefits Other Than Pensions* and the standards of GASB Statement No. 75, *Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions*. The Authority’s Board of Directors appointed a five-member Board of Trustees, made up of Authority senior managers, to control and manage the trust.

An initial deposit of \$10.8 million was made to the trust upon establishment of the trust. The balance of the trust at June 30, 2018 and 2017 was \$29.8 million and \$22.8 million, respectively.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Management's Discussion and Analysis – Required Supplementary Information

June 30, 2018 and 2017

(Unaudited)

Capital Assets and Debt Administration

Capital Assets

As of June 30, 2018 and 2017, the Authority had \$5.9 billion and \$6.0 billion of capital assets (net of depreciation), respectively. This includes land, construction in progress, plant and equipment for the water and sewer systems, furniture and fixtures, leasehold improvements, and motor vehicles and equipment. The Authority's net capital assets decreased approximately \$75.1 million, or 1.2%, during fiscal year 2018, primarily due to the rate of depreciation being higher than the rate of capitalization.

	Capital Assets			Percentage	Percentage
	(Net of depreciation, dollars in thousands)			change	change
	2018	2017	2016	2018–2017	2017–2016
Land	\$ 29,878	\$ 29,873	\$ 29,868	0.0%	0.0%
Construction in progress	180,525	127,423	115,758	41.7	10.1
Plant and equipment, water, and sewer systems	5,730,797	5,859,216	5,956,351	(2.2)	(1.6)
Furniture and fixtures	132	213	274	(38.0)	(22.3)
Leasehold improvements	279	291	303	(4.1)	(4.0)
Motor vehicles and equipment	6,739	6,398	5,536	5.3	15.6
Total	<u>\$ 5,948,350</u>	<u>\$ 6,023,414</u>	<u>\$ 6,108,090</u>	<u>(1.2%)</u>	<u>(1.4%)</u>

Debt Administration

The Authority's bond sales must be approved by its board of directors (the Board) and must comply with rules and regulations of the United States Treasury Department. Neither the Commonwealth of Massachusetts (the Commonwealth) nor any political subdivision thereof shall be obligated to pay the principal of, or premium or interest on, any debt outstanding and neither the faith and credit nor the taxing power of the Commonwealth or any political subdivision thereof is pledged to such payment.

Bond Resolutions

Pursuant to its general bond resolution, the Authority must comply with a rate covenant that requires it to set rates to maintain revenues sufficient to pay: current expenses; debt service on indebtedness; required deposits to reserves; costs of maintenance, replacement, and/or improvements to the wastewater and water systems that are considered current expenses and any additional amounts the Authority may be required to pay by any law or contract.

In addition to the rate covenant, the Authority is required to meet two covenants with respect to debt service coverage. The primary debt service coverage requires that the Authority fix and adjust rates and charges to provide revenues available for bond debt service in an amount equal to 1.2 times that is required for debt service on all outstanding bonds, not including subordinated bonds. The subordinated debt service coverage requires that the Authority fix and adjust rates and charges to provide revenues available for bond debt service in an amount equal to 1.1 times that is required for debt service on all outstanding bonds, including subordinated bonds.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Management's Discussion and Analysis – Required Supplementary Information

June 30, 2018 and 2017

(Unaudited)

Credit Rating

The Authority's \$3.2 billion Senior Lien General Revenue Bonds are rated Aa1 from Moody's Investors Service, AA+ by S&P Global Ratings and AA+ from FitchRatings. The \$831 million Subordinate Lien General Revenue Bonds are rated Aa2 from Moody's Investors Service, AA by S&P Global Ratings and AA from FitchRatings. Some of the Authority's revenue bonds are enhanced by bond insurance. The credit ratings of these bond series will be the higher rating of either the Authority or the firm providing the enhancement. In the case of bonds enhanced by a letter of credit, the rating will be the highest of the Authority's, the provider or, if available, a joint rating. The subordinated debt of \$943 million with the Massachusetts Clean Water Trust is not rated as the Authority's debt.

Economic Factors and Next Year's Budget

In June 2018, the Board approved the fiscal year 2019 Current Expense Budget (CEB), which totals \$767.9 million in expenses.

The \$767.9 million expense total is comprised of \$482.3 million (62.8%) in capital financing costs and \$285.6 million (37.2%) in operating expenses, of which \$239.6 million (83.9%) is for direct expenses and \$46.0 million (16.1%) is for indirect expenses. The total represents an increase of \$31.1 million from fiscal year 2018 spending, which is comprised of \$22.3 million in higher operating costs and \$8.8 million in lower debt service costs.

The fiscal year 2019 rate revenue requirement approved by the Board is \$739 million; an increase of 3.07% compared with the fiscal year 2018 budget.

Fiscal year 2019 budgeted nonrate revenue totals \$28.9 million, a decrease of \$5.1 million from actual fiscal year 2018 nonrate revenue. The nonrate revenue budget is comprised of \$13.6 million in investment income, \$14.6 million in other user charges and other revenue and \$.7 million in entrance fees.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Management's Discussion and Analysis – Required Supplementary Information

June 30, 2018 and 2017

(Unaudited)

CIP 10 Year Plan

The Authority's planned spending for capital improvements in future years reflects the Authority's ongoing efforts to upgrade and maintain the system and to align its project prioritization process with the Master Plan.

Major planned and ongoing projects include:

- Commitment to long-term redundancy plan for the metropolitan water tunnel system and an emergency pump station at the Wachusett reservoir.
- Improvement and replacement of equipment on Deer Island and at major headworks facilities to ensure continued efficient and effective operations.
- Completion of covered storage facilities to provide safe, reliable storage for water treated at John J. Carroll water treatment plant and transported through the MetroWest Tunnel and Hultman Aqueduct.
- Dedication to using resources efficiently, responding to climate change and reducing the environmental impacts of the Authority's daily operations by installing alternative energy sources and promotion of improved self-generation.
- Enhanced commitment to the community assistance programs for both the sewer and water systems to improve local infrastructure, including a new initiative to provide interest-free loans to assist communities in replacing lead service lines.
- Continued investment for the upgrade of Management Information Systems to ensure the availability, integrity and security of data.
- Continue the Residuals Asset Protection program for maintaining and improving the operations and infrastructure of the biosolids processing in the long term.

Contacting the Authority's Financial Management

This report is designed to provide our bondholders, member communities and other interested parties with a general overview of the Authority's finances and to demonstrate the Authority's accountability for the revenue it receives. If you have questions about this report or need additional information, contact the Massachusetts Water Resources Authority, Finance Division, 100 First Avenue, Boston, MA 02129.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Statements of Net Position

June 30, 2018 and 2017

(Dollars in thousands)

Assets	<u>2018</u>	<u>2017</u>
Unrestricted current assets:		
Cash and cash equivalents (note 4)	\$ 52,614	\$ 50,266
Investments (note 4)	11,252	11,606
Intergovernmental loans (note 7)	31,254	30,579
Accounts receivable	<u>843</u>	<u>759</u>
Total unrestricted current assets	<u>95,963</u>	<u>93,210</u>
Restricted assets:		
Investments (note 4)	724,428	705,593
Interest receivable	1,731	1,662
Grants receivable	<u>945</u>	<u>-</u>
Total restricted assets	<u>727,104</u>	<u>707,255</u>
Capital assets:		
Capital assets – not being depreciated (note 8)	210,403	157,296
Capital assets – being depreciated – net (note 8)	<u>5,737,947</u>	<u>5,866,118</u>
Total capital assets	5,948,350	6,023,414
Regulatory assets (note 3)	505,915	622,428
Other assets, net (note 7)	<u>210,463</u>	<u>201,714</u>
Total assets	<u>7,487,795</u>	<u>7,648,021</u>
Deferred Outflows of Resources		
Deferred outflows from pension (note 10)	17,154	47,910
Deferred outflows from derivative instruments (note 6)	20,988	35,755
Deferred outflows from refunding debt	47,597	68,344
Liabilities		
Current liabilities:		
Accounts payable and accrued expenses	49,465	56,300
Commercial paper notes (note 6)	75,000	99,000
Current portion of long-term debt (note 6)	<u>225,917</u>	<u>193,839</u>
Total current liabilities	<u>350,382</u>	<u>349,139</u>
Payable from restricted assets:		
Accounts payable for construction	19,656	18,847
Accrued interest on bonds payable	79,991	78,497
Reserves (note 5)	<u>58,074</u>	<u>57,253</u>
Total payable from restricted assets	157,721	154,597
Retainage on construction in progress	9,567	7,098
Long-term debt – less current portion (note 6)	5,192,316	5,337,619
Long-term capital lease (note 9)	27,219	28,261
Net pension liability (note 10)	21,025	45,804
Net OPEB liability (note 11)	121,204	110,375
Liability for derivative instruments (note 6)	<u>20,988</u>	<u>35,755</u>
Total liabilities	<u>5,900,422</u>	<u>6,068,648</u>
Deferred Inflows of Resources		
Deferred inflows from pension (note 10)	14,963	11,810
Deferred inflows from OPEB (note 11)	10,032	-
Deferred inflows from regulated activities (note 3)	42,718	53,275
Net Position		
Net investment in capital assets	759,757	729,903
Restricted	357,767	339,073
Unrestricted	<u>487,875</u>	<u>597,321</u>
Total net position	<u>\$ 1,605,399</u>	<u>\$ 1,666,297</u>
Commitments and contingencies (notes 9,10,11,12 and 13)		

See accompanying Notes to Financial Statements

MASSACHUSETTS WATER RESOURCES AUTHORITY

Statements of Revenues, Expenses, and Changes in Net Position

Years ended June 30, 2018 and 2017

(Dollars in thousands)

	<u>2018</u>	<u>2017</u>
Operating revenues (note 2):		
Customer services	\$ 728,281	\$ 705,933
Other	10,023	10,843
Total operating revenues	<u>738,304</u>	<u>716,776</u>
Operating Expenses:		
Operations	106,943	106,844
Maintenance	29,067	30,799
Payments in lieu of taxes	8,220	8,191
Engineering, general, and administrative	133,627	140,435
Total operating expenses	<u>277,857</u>	<u>286,269</u>
Income from operating before depreciation	460,447	430,507
Depreciation and amortization	<u>202,799</u>	<u>201,481</u>
Operating Income	257,648	229,026
Regulatory accounting provisions:		
Change in reserves (note 5)	(821)	168
Change in regulatory provisions, net (note 3)	<u>(105,956)</u>	<u>(62,882)</u>
Total regulatory accounting provisions	<u>(106,777)</u>	<u>(62,714)</u>
Nonoperating revenues (expenses):		
Debt service grant	945	391
Investment income	3,995	3,124
Interest expense	(203,267)	(217,803)
Changes in derivative related accounts	2,940	2,940
Total nonoperating expenses	<u>(195,387)</u>	<u>(211,348)</u>
Net loss before capital grants and contributions	(44,516)	(45,036)
Capital grants and contributions	<u>4,715</u>	<u>7,224</u>
Decrease in net position	(39,801)	(37,812)
Total net position - beginning of year	1,666,297	1,704,109
Restatement to comply with GASB Statement No. 75 (note 2a)	<u>(21,097)</u>	<u>-</u>
Total net position - end of year	<u>\$ 1,605,399</u>	<u>\$ 1,666,297</u>

See accompanying Notes to Financial Statements

MASSACHUSETTS WATER RESOURCES AUTHORITY

Statements of Cash Flows

Years ended June 30, 2018 and 2017

(Dollars in thousands)

	2018	2017
Cash flows from operating activities:		
Cash received from customers	\$ 728,207	\$ 705,858
Cash paid to suppliers for goods and services	(121,879)	(116,749)
Cash paid to employees for services	(131,123)	(129,500)
Cash paid in lieu of taxes	(8,220)	(8,191)
Other operating receipts	9,949	11,261
Net cash provided by operating activities	476,934	462,679
Cash flows from capital and related financing activities:		
Proceeds from sale of revenue bonds, loans, and notes	151,604	163,170
Capital grants for construction	4,715	7,224
Debt service grant	-	391
Capital lease principal payments	(1,041)	(963)
Capital lease interest payments	(2,175)	(2,254)
Repayment of debt	(261,177)	(289,264)
Interest paid on debt	(203,971)	(202,636)
Plant expenditures	(147,981)	(127,695)
Net cash used for capital and related financing activities	(460,026)	(452,027)
Cash flows from investing activities:		
Purchases of short-term investments	(9,910)	(135,579)
Sales and maturities of short-term investments	-	57,766
Changes in restricted money market investments	(17,400)	40,165
Interest received	12,750	9,551
Net cash used for investing activities	(14,560)	(28,097)
Net increase (decrease) in cash and cash equivalents	2,348	(17,445)
Cash and cash equivalents - beginning of year	50,266	67,711
Cash and cash equivalents - end of year	\$ 52,614	\$ 50,266
Reconciliation of operating income to net cash provided by operating activities:		
Operating income	\$ 257,648	\$ 229,026
Adjustments to reconcile operating income to net cash provided by operating activities:		
Depreciation and amortization	202,799	201,481
Change in net pension liability	(24,779)	17,055
Change in deferred outflows from pension	30,756	(8,757)
Change in deferred inflows from pension	3,153	6,224
Change in net OPEB liability	(10,268)	-
Change in deferred inflows from OPEB	10,032	-
Change in other accounts	5,059	5,259
Change in accounts payable	2,534	12,391
Net cash provided by operating activities	\$ 476,934	\$ 462,679

NONCASH CAPITAL AND RELATED FINANCING ACTIVITIES

In fiscal 2018, general revenue refunding bonds in the aggregate principal amount of \$122,510 were issued to defease \$75,545 of bonds outstanding and retire \$50,000 of commercial paper notes.

In fiscal 2017, general revenue refunding bonds in the aggregate principal amount of \$359,005 were issued to defease \$408,680 of bonds outstanding.

See accompanying Notes to Financial Statements

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

(1) Organization

The Massachusetts Water Resources Authority (the Authority) was established in January 1985 pursuant to Chapter 372 (the Enabling Act) of the Act of 1984 of the Commonwealth of Massachusetts (the Commonwealth). The Authority, a successor agency to certain functions of the Metropolitan District Commission (the MDC) (which became part of the Department of Conservation and Recreation (the DCR) in July 2003), is a public instrumentality and, effective July 1, 1985, provides water supply services and sewage collection, treatment, and disposal services to areas of the Commonwealth.

The Authority is governed by an 11-member board of directors (the Board) chaired by the Secretary of Energy and Environmental Affairs for the Commonwealth. The Secretary and two other members are appointed by the Governor. Three members of the Board are appointed by the Mayor of Boston and three are appointed by the Authority's Advisory Board. One member is appointed by the Mayor of Quincy and one by the Winthrop Council President.

(2) Summary of Significant Accounting Policies

The accounting policies of the Authority conform to U.S. generally accepted accounting principles as applicable to government enterprises. The following is a summary of the Authority's significant accounting policies:

(a) Basis of Presentation

The Authority is required by the Enabling Act to establish user rates for its water and sewer services which provide sufficient funds to recover the costs of operations (excluding depreciation), debt service, maintenance, replacements, improvements to its facilities, and appropriate reserves. The Authority's financial statements are reported on the accrual basis of accounting and the economic measurement focus as specified by the Governmental Accounting Standards Board's (GASB) requirements for an enterprise fund.

The Authority distinguishes operating revenues and expenses from nonoperating items. Operating revenues and expenses generally result from providing water and sewer services to its member communities. All revenues and expenses not meeting this definition are reported as nonoperating revenues and expenses. All operating revenues are pledged for repayment of outstanding debt service.

In addition, the Authority applies the provisions of GASB Statement No. 62, *Codification of Accounting and Financial Reporting Guidance Contained in Pre-November 30, 1989 FASB and AICPA Pronouncements*, to provide a better matching of revenues and expenses. The effect of this policy has been to defer certain outflows of resources, which will be recovered through future revenues in accordance with the Authority's rate model, and to record deferred inflows of resources for revenue collected through current rates for costs expected to be incurred in the future. The effects of the Authority's accounting policies are discussed further in Note 3.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

The Authority has implemented GASB Statement No. 75, *Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions*. This Statement requires that the net OPEB liability be reflected on the Statements of Net Position, as well as the deferred inflows and outflows of resources from OPEB activities. In accordance with the Statement, the Authority has restated Net Position at July 1, 2017. Restating the prior year was not practical.

(b) Capital Assets

On July 1, 1985, ownership of the MDC’s sewer and waterworks personal property was transferred to the Authority. Pursuant to the Enabling Act, ownership of the real property of the MDC sewer and waterworks systems was not transferred from the Commonwealth to the Authority; however, the Authority has the right to use, improve, maintain, and manage that property. In addition, ownership of the real and personal property of the watershed system remains with the Commonwealth; however, the Authority has the right to utilize the water therefrom for water supply purposes.

The personal property, together with the rights to the real property and watershed system, was recorded at its estimated fair value of \$2,331,465 (including certain construction projects which were in progress as of July 1, 1985), based upon an appraisal performed by valuation specialists. Property, plant, and equipment acquired or constructed since July 1, 1985, is stated at historical cost, and includes the expenditure of capital grants in aid of construction.

Betterments and major renewals are capitalized and included in capital asset accounts, while expenditures for maintenance and repairs are charged to expense when incurred. The cost of depreciable assets and related accumulated depreciation is eliminated from the accounts when such items are disposed of or otherwise retired.

(c) Interest Cost and Principal Payments on Construction

During fiscal years 2018 and 2017, none of the Authority’s interest expense was capitalized to construction in progress in accordance with its current policy of recovering such costs through rates as incurred. Rates collected for principal payments on debt related to assets under construction are deferred until the related asset is completed and depreciation commences.

(d) Depreciation

The Authority provides for depreciation by use of the straight-line method. Depreciation is intended to distribute the cost of depreciable properties, including those financed by capital grants in aid of construction, over the following estimated average useful lives:

	<u>Years</u>
Plant and Equipment, Water and Sewerage Systems	5–100
Motor Vehicles and Equipment	5
Furniture and Fixtures	7
Leasehold Improvements	3–5

(e) Revenue Recognition

The Authority recognizes revenue as amounts become collectible from its customers for water and sewer services provided. The majority of the Authority’s billings to cities and towns are subject to, in the event of nonpayment, the local aid intercept allowed by the Enabling Act.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

(f) Cash and Cash Equivalents

The Authority's policy is to treat unrestricted investments with a maturity date of three months or less when purchased as cash equivalents for purposes of the statements of cash flows. Restricted cash and cash equivalents are combined with investments on the statements of net position, and shown separately on the statements of cash flows as an investing activity.

(g) Payments in Lieu of Taxes

The Enabling Act authorizes and directs the Authority to pay to the DCR (formerly the MDC) Division of Watershed Management, who in turn remits payment to each city or town in which land of the Quabbin watershed and Ware River watershed is located. Each such payment is equal to the amount which the respective city or town would receive in property taxes, based upon the fair value of such land if such land were not tax exempt.

(h) Investments

Investments are recorded at fair value, other than certain investments that are recorded at net asset value (NAV). The Authority uses an independent pricing source to determine the fair value of investments at quoted market prices. Changes in fair value are included in nonoperating investment income in the Statements of Revenues, Expenses, and Changes in Net Position. Investments that are measured at NAV are the investments in the Massachusetts Municipal Depository Trust (MMDT) which is a 2a7-like external investment pool that is overseen by the Massachusetts State Treasurer and whose fair value of each share is equal to the number of shares; thus NAV is equal to \$1.00 per share.

(i) Use of Estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenditures during the reporting period. Actual results could differ from those estimates.

(j) Compensated Absences

Employees of the Authority may accumulate unused sick time of which 30% will be paid in cash upon retirement from the Authority. The liability for vacation leave is based on the amount earned but not used; for sick leave, it is based on a percentage of the amount accumulated at the statement of net position dates. The liability for both amounts is calculated based on the pay or salary rates in effect at the statements of net position dates.

(k) Pensions

For purposes of measuring the net pension liability, deferred outflows of resources and deferred inflows of resources related to pensions, and pension expense, information about the fiduciary net position of the Plan and additions to/deductions from the Plan's fiduciary net position have been determined on the same basis as they are reported by the Authority. For this purpose, benefit payments (including refunds of employee contributions) are recognized when due and payable in accordance with the benefit terms. Investments are reported at fair value.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

(l) Postemployment Benefits Other Than Pensions (OPEB)

For purposes of measuring the net OPEB liability, deferred outflows of resources and deferred inflows of resources related to OPEB, and OPEB expense, information about the fiduciary net position of the MWRA and additions to/deductions from the MWRA's fiduciary net position have been determined on the same basis as they are reported by the MWRA. For this purpose, the MWRA recognizes benefit payments when due and payable in accordance with the benefit terms. Investments are reported at fair value, except for money market investments and participating interest-earning investment contracts that have a maturity at the time of purchase of one year or less, which are reported at cost.

(m) Reclassifications

Certain reclassifications were made to the fiscal year 2017 financial statements to conform to the fiscal year 2018 presentation.

(3) Regulatory Assets and Deferred Inflows from Regulatory Activities

In accordance with GASB Statement No. 62, *Codification of Accounting and Financial Reporting Guidance Contained in Pre-November 30, 1989 FASB and AICPA Pronouncements*, regulatory assets and deferred inflows from regulatory activities that result primarily from differences between depreciation on property, plant, and equipment not financed by grants or capital contributions, which is recovered through rates as principal payments on debt service, and from amounts determined by the Board to be utilized in a subsequent year to reduce customer billings (rate stabilization).

A summary of the activity of regulatory assets and deferred inflows for fiscal years 2018 and 2017 is as follows:

	<u>Sewer</u>	<u>Water</u>	<u>Total</u>
Balance - June 30, 2016 - net	\$ 538,600	\$ 93,435	\$ 632,035
Difference Between Depreciation of Capital Assets Not Financed by Grants or Capital Contributions, and Debt Service in Excess of Interest Expense	(59,876)	(24,337)	(84,213)
Other, Net	<u>10,897</u>	<u>10,434</u>	<u>21,331</u>
Balance - June 30, 2017 - net	489,621	79,532	569,153
Difference Between Depreciation of Capital Assets Not Financed by Grants or Capital Contributions, and Debt Service in Excess of Interest Expense	(70,597)	(37,394)	(107,991)
Rate Stabilization, Net	(6,532)	-	(6,532)
Other, Net	<u>(157)</u>	<u>8,724</u>	<u>8,567</u>
Balance - June 30, 2018 - net	<u>\$ 412,335</u>	<u>\$ 50,862</u>	<u>\$ 463,197</u>

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

The net balance at June 30, 2018 and 2017 is presented on the statements of net position as follows:

	<u>2018</u>	<u>2017</u>	<u>Current year change</u>
Regulatory Assets	\$ 505,915	\$ 622,428	\$ (116,513)
Deferred Inflows from Regulatory Activities	(42,718)	(53,275)	10,557
Net Change	<u>\$ 463,197</u>	<u>\$ 569,153</u>	<u>\$ (105,956)</u>

The balance in the rate stabilization reserve was \$43,044 and \$36,512 at June 30, 2018 and 2017, respectively.

(4) Deposits and Investments

The following represents essential risk information about the Authority's deposits and investments:

(a) Custodial Credit Risk – Deposits

The custodial credit risk for deposits and certificates of deposit is the risk that, in the event of a bank failure, the Authority's deposits may not be recovered.

The bank deposits at June 30, 2018 and 2017 were \$40,521 and \$40,785, respectively. Of these amounts, \$40,271 and \$40,535, were exposed to custodial credit risks as uninsured and uncollateralized.

(b) Investments

The Authority is authorized by its general bond resolution to invest in obligations of the U.S. Treasury, its agencies and instrumentalities, bonds, or notes of public agencies or municipalities, bank time deposits, guaranteed interest contracts, Massachusetts Municipal Depository Trust (MMDT) accounts, interest rate swap agreements, and repurchase agreements. All investments are held by a third-party in the Authority's name. These investments are recorded at fair value.

(c) Credit Ratings

All debt securities purchased, such as FNMA, FHLMC, and FHLB issues have historically had a credit rating of AAA or they have been collateralized to AAA. On August 8, 2011, Standard & Poor's reduced the credit rating for these agencies to AA+. The reduction in credit rating did not affect the Authority's bond covenants or escrow requirements.

The Massachusetts Municipal Depository Trust funds are not rated.

The general bond resolution limits the Authority to investing in securities that are rated in the three highest rating categories as defined by S&P and Moody's or other rating agencies.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

(d) Concentration Risk

At June 30, 2018 and 2017, the Authority had no investments, at fair value, which exceeded 5% of the Authority's total investments.

(e) Interest Rate Risk

The following is a listing of the Authority's fixed income investments and related maturity schedule as of June 30, 2018 and 2017:

June 30, 2018					
Investment maturities (in years)					
Investment Type	Fair Value	<1	1-3	4-8	>9
Mass Municipal Depository Trust	\$ 479,319	\$ 479,319	\$ -	\$ -	\$ -
U.S. Agency Obligations	246,403	17,995	23,207	197,386	7,815
U.S. Treasury Bills	9,958	9,958	-	-	-
Total	<u>\$ 735,680</u>	<u>\$ 507,272</u>	<u>\$ 23,207</u>	<u>\$ 197,386</u>	<u>\$ 7,815</u>

June 30, 2017					
Investment maturities (in years)					
Investment Type	Fair Value	<1	1-3	4-8	>9
Mass Municipal Depository Trust	\$ 461,921	\$ 461,921	\$ -	\$ -	\$ -
U.S. Agency Obligations	255,278	-	18,570	158,026	78,682
Total	<u>\$ 717,199</u>	<u>\$ 461,921</u>	<u>\$ 18,570</u>	<u>\$ 158,026</u>	<u>\$ 78,682</u>

The majority of the Authority's investments are held in short-term money market funds and long-term investments in U.S. agency obligations that are held in the debt service reserve funds where the intent is to hold until maturity.

(f) Investment Values

The Authority categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles. Debt securities classified in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Debt 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 Authority has no securities classified in Level 3. The investment in MMDT, an external investment pool, is measured at \$1.00 per share – the net asset value determined by the pool.

The Authority has the following recurring fair value measurements as of June 30, 2018 and 2017: U.S. Government agency obligations \$246,403 and \$255,278 (Level 2), respectively, U.S. Treasury Bills \$9,958 and \$0 (Level 2), respectively, and MMDT \$479,319 and \$461,921 (NAV), respectively. There are no withdrawal restrictions or unfunded commitments related to the MMDT investment.

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(Dollars in thousands)

(g) Restricted Investments by Fund

The following summarizes restricted investments as of June 30, 2018 and 2017 by various funds and accounts established by the Authority for debt covenants and other purposes:

	<u>2018</u>	<u>2017</u>
Restricted Investments:		
Construction	\$ 105,802	\$ 117,813
Debt Service Reserves	149,933	150,250
Debt Service	302,690	273,811
Operating Reserve	40,070	39,249
Rate Stabilization Reserve	43,044	36,512
Revenue Redemption	25,075	25,911
Revenue	29,952	33,372
Renewal and Replacement Reserve	6,747	8,042
Insurance	14,000	14,000
Insurance Related Escrow Deposits	<u>7,115</u>	<u>6,633</u>
Total Restricted Investments	<u>\$ 724,428</u>	<u>\$ 705,593</u>

(5) Bond Resolution Reserves

The components of the reserves funded from revenues and required by the general and supplemental bond resolutions at June 30, 2018 and 2017 are as follows:

<u>Reserves</u>	<u>Sewer</u>	<u>Water</u>	<u>Total</u>	
			<u>2018</u>	<u>2017</u>
Renewal and Replacement	\$ 2,544	\$ 1,457	\$ 4,001	\$ 4,001
Insurance	7,000	7,000	14,000	14,000
Operating	<u>26,178</u>	<u>13,895</u>	<u>40,073</u>	<u>39,252</u>
Total	<u>\$ 35,722</u>	<u>\$ 22,352</u>	<u>\$ 58,074</u>	<u>\$ 57,253</u>

A renewal and replacement reserve of \$6,000 was established through grant receipts transferred from the Commonwealth in 1985 and is included in restricted net position at June 30, 2018 and 2017.

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Notes to Financial Statements

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(Dollars in thousands)

(6) Notes Payable and Long-Term Debt

Long-term debt at June 30, 2018 and 2017 consisted of the following:

	<u>2018</u>	<u>2017</u>
General Revenue Bonds:		
2002 Series J, 5 1/4% to 5 1/2%, issued December 18, 2002, due 2018 to 2022	\$ 189,020	\$ 241,340
2010 Series A, 4%, issued May 6, 2010	-	1,390
2011 Series B, 4 1/8% to 5%, issued May 19, 2011, due 2018 to 2031	7,850	8,360
2012 Series A, 3 1/4% to 5%, issued April 19, 2012, due 2018 to 2042	74,590	74,590
2014 Series D, 5%, issued November 19, 2014, due 2021 to 2044	60,165	61,545
2016 Series B, 3% to 5%, issued May 12, 2016, due 2018 to 2040	63,370	65,970
2017 Series B, 5%, issued May 18, 2017, due 2018 to 2042	68,240	68,240
2018 Series B, 3% to 5%, issued May 16, 2018, due 2019 to 2043	107,580	-
Total	<u>570,815</u>	<u>521,435</u>
General Revenue Refunding Bonds:		
2006 Series B, 5%, issued March 16, 2006	-	30,430
2007 Series B, 5 1/4%, issued February 1, 2007, due 2023 to 2038	647,950	647,950
2009 Series B, 5%, issued February 19, 2009, due 2018 to 2022	126,415	145,225
2010 Series B, 5%, issued May 6, 2010, due 2018 to 2027	95,945	98,645
2011 Series C, 3 1/8% to 5 1/4%, issued December 8, 2011, due 2018 to 2042	321,160	321,160
2012 Series B, 4 1/4% to 5%, issued April 19, 2012, due 2026 to 2029	86,775	86,775
2013 Series A, 4% to 5%, issued March 27, 2013, due 2022 to 2036	102,515	142,030
2014 Series E, 5%, issued November 19, 2014, due 2018 to 2020	15,605	15,605
2014 Series F, 4% to 5%, issued November 19, 2014, due 2021 to 2041	141,410	141,410
2016 Series C, 4% to 5%, issued May 12, 2016, due 2022 to 2040	678,185	681,615
2016 Series D, 3% to 5%, issued August 24, 2016, due 2024 to 2042	104,260	104,260
2017 Series C, 4% to 5%, issued May 18, 2017, due 2018 to 2032	249,500	254,745
2018 Series C, 5%, issued May 16, 2018, due 2023 to 2026	21,900	-
Total	<u>2,591,620</u>	<u>2,669,850</u>

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(Dollars in thousands)

	<u>2018</u>	<u>2017</u>
General Revenue Bonds with the Massachusetts		
Clean Water Trust:		
1998 Series C, 4 3/4%, issued		
July 9, 1998, due 2018	\$ 420	\$ 835
1999 Series E Sewer, 4 3/4%, issued		
October 6, 1999, due 2018 to 2029	5,583	5,954
1999 Series E Water, 4 3/4%, issued		
October 6, 1999, due 2018 to 2019	1,580	2,335
1999 Series F, 5 3/4% to 6%, issued		
November 3, 1999, due 2018 to 2029	181,030	198,475
2000 Series E Sewer, 5 1/4% to 5 5/8%, issued		
November 1, 2000, due 2018 to 2030	43,511	45,921
2000 Series E Water, 5 1/4% to 5 5/8%, issued		
November 1, 2000, due 2018 to 2020	2,470	3,240
2001 Series C Water, 5% , issued		
July 26, 2001, due 2019 to 2021	1,065	1,400
2001 Series D Sewer, 5 3/8% to 5 3/4%, issued		
July 26, 2001, due 2018 to 2029	1,532	2,031
2001 Series D Water, 5 1/2% to 5 3/4%, issued		
July 26, 2001, due 2018 to 2019	224	331
2002 Series H Sewer, 5% to 5 1/4%, issued		
October 31, 2002, due 2018 to 2032	57,095	59,960
2002 Series H Water, 5% to 5 1/4%, issued		
October 31, 2002, due 2018 to 2022	10,415	12,290
2002 Series I Sewer, 5 1/4% to 5 1/2%, issued		
October 31, 2002, due 2018 to 2030	1,539	1,629
2002 Series I Water, 5 1/4%, issued		
October 31, 2002, due 2018 to 2020	6	8
2003 Series A Water, 5%, issued		
October 31, 2002, due 2018 to 2022	475	561
2003 Series B Water, 5%, issued		
July 24, 2003, due 2019 to 2021	965	1,265
2003 Series C Sewer, 4 1/4% to 5 1/4%, issued		
November 6, 2003, due 2018 to 2033	21,010	21,968
2003 Series C Water, 4 3/4% to 5 1/4%, issued		
November 6, 2003, due 2018 to 2023	7,885	9,045
2004 Series C Sewer, 4 1/4% to 5 1/4%, issued		
October 26, 2004, due 2018 to 2033	7,123	7,453
2004 Series C Water, 5%, issued		
October 26, 2004, due 2018 to 2022	416	535
2004 Series D Sewer, 4 1/2% to 5%, issued		
November 29, 2004, due 2018 to 2034	38,605	40,165
2004 Series D Water, 5%, issued		
November 29, 2004, due 2018 to 2024	5,935	6,625
2005 Series C Sewer, 4 1/4% to 5 1/4%, issued		
November 3, 2005, due 2018 to 2033	4,415	4,702
2005 Series C Water, 4 1/4% to 5%, issued		
November 3, 2005, due 2018 to 2023	412	473

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(Dollars in thousands)

	<u>2018</u>	<u>2017</u>
General Revenue Bonds with the Massachusetts		
Clean Water Trust (Continued):		
2005 Series D Sewer, 2 3/10%, issued		
November 16, 2005, due 2018 to 2035	\$ 43,526	\$ 45,454
2005 Series D Water, 0% to 2%, issued		
November 16, 2005, due 2018 to 2025	6,168	6,920
2005 Series E Sewer, 2%, issued		
November 16, 2005, due 2018 to 2025	182	203
2005 Series E Water, 2%, issued		
November 16, 2005, due 2018 to 2025	41	45
2006 Series C Sewer, 5%, issued		
October 26, 2006, due 2018 to 2034	5,590	5,920
2006 Series D Sewer, 2 3/10%, issued		
December 14, 2006, due 2018 to 2036	41,745	43,469
2006 Series D Water, 0% to 2%, issued		
December 14, 2006, due 2018 to 2026	13,862	15,360
2006 Series E Sewer, 2%, issued		
December 14, 2006, due 2018 to 2026	187	206
2006 Series E Water, 2%, issued		
December 14, 2006, due 2018 to 2026	84	93
2007 Series C Sewer, 2% to 2 3/10%, issued		
November 9, 2007, due 2018 to 2035	2,311	2,560
2007 Series C Water, 2%, issued		
November 9, 2007, due 2018 to 2025	1,229	1,381
2007 Series D Sewer, 2 3/10%, issued		
November 9, 2007, due 2018 to 2036	17,134	17,845
2007 Series E Sewer, 2 2/5%, issued		
December 18, 2007, due 2018 to 2037	41,562	43,695
2007 Series E Water, 2%, issued		
December 18, 2007, due 2018 to 2027	10,998	11,982
2008 Series G Sewer, 2%, issued		
December 9, 2008, due 2018 to 2026	3,092	3,421
2008 Series G Water, 2%, issued		
December 9, 2008, due 2018 to 2026	656	723
2009 Series C Sewer, 2% to 2 2/5%, issued		
March 18, 2009, due 2018 to 2038	56,504	60,714
2009 Series C Water, 2%, issued		
March 18, 2009, due 2018 to 2028	18,181	19,645
2009 Series D Sewer, 2% to 2 2/5%, issued		
December 15, 2009, due 2018 to 2037	7,626	8,081
2009 Series D Water, 2%, issued		
December 15, 2009, due 2018 to 2027	759	826
2010 Series D Sewer, 2% to 2 2/5%, issued		
July 8, 2010, due 2018 to 2040	20,521	21,408
2010 Series D Water, 2%, issued		
July 8, 2010, due 2018 to 2030	16,034	17,103
2011 Series A Sewer, 2% to 2 2/5%, issued		
March 15, 2011, due 2018 to 2038	4,130	4,407

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(Dollars in thousands)

	<u>2018</u>	<u>2017</u>
General Revenue Bonds with the Massachusetts		
Clean Water Trust (Continued):		
2011 Series A Water, 2%, issued		
March 15, 2011, due 2018 to 2028	\$ 3,505	\$ 3,791
2012 Series C Sewer, 2% to 2 2/5%, issued		
June 6, 2012, due 2018 to 2040	5,828	6,218
2012 Series C Water, 2%, issued		
June 6, 2012, due 2018 to 2030	2,866	3,055
2012 Series D Sewer, 2% to 2 2/5%, issued		
June 13, 2012, due 2018 to 2042	34,522	36,514
2012 Series D Water, 2%, issued		
June 13, 2012, due 2018 to 2032	6,774	7,153
2013 Series B Sewer, 2% to 2 2/5%, issued		
May 22, 2013, due 2019 to 2043	24,255	25,863
2013 Series B Water, 2%, issued		
May 22, 2013, due 2019 to 2033	6,792	7,171
2014 Series C Sewer, 2% to 2 2/5%, issued		
May 30, 2014, due 2018 to 2042	4,215	4,395
2014 Series C Water, 2%, issued		
May 30, 2014, due 2018 to 2032	4,681	4,959
2015 Series A Sewer, 2% to 2 2/5%, issued		
January 7, 2015, due 2019 to 2045	43,402	44,949
2015 Series A Water, 2%, issued		
January 7, 2015, due 2019 to 2035	13,847	14,515
2015 Series B Sewer, 2% to 2 2/5%, issued		
May 14, 2015, due 2018 to 2043	2,816	3,011
2015 Series B Water, 2%, issued		
May 14, 2015, due 2018 to 2033	1,835	1,945
2016 Series A Sewer, 2% to 2 2/5%, issued		
March 11, 2016, due 2019 to 2046	36,943	38,126
2016 Series A Water, 2%, issued		
March 11, 2016, due 2019 to 2036	12,565	13,130
2017 Series A Sewer, 2%, issued		
April 13, 2017, due 2019 to 2036	8,389	8,743
2017 Series A Water, 2%, issued		
April 13, 2017, due 2019 to 2036	23,812	24,251
Total	<u>942,880</u>	<u>1,006,451</u>
General Revenue Bonds (Variable Rates):		
1999 Series B, 0.73% to 1.84%, issued		
January 29, 1999, due 2018 to 2028	54,700	58,600
Total	<u>54,700</u>	<u>58,600</u>

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	<u>2018</u>	<u>2017</u>
General Revenue Refunding Bonds (Variable Rates):		
2002 Series C, 0.55% to 1.72%, issued August 15, 2002, due 2020	\$ 35,120	\$ 35,120
2008 Series A, 0.76% to 1.80%, issued May 29, 2008, due 2018 to 2037	209,425	212,890
2008 Series C, 0.77% to 1.82%, issued May 29, 2008, due 2018 to 2026	86,300	101,300
2008 Series E, 0.76% to 1.77%, issued May 29, 2008, due 2020 to 2037	133,640	133,640
2012 Series E, 1.22% to 2.26%, issued November 15, 2012, due 2018 to 2031	59,950	61,415
2012 Series F, 1.14% to 2.08%, issued November 15, 2012	-	52,075
2012 Series G, 1.32% to 2.30%, issued November 15, 2012, due 2018 to 2023	36,900	46,900
2014 Series A, 1.08% to 1.93%, issued May 20, 2014, due 2022 to 2025	50,000	50,000
2014 Series B, 1.22% to 2.01%, issued May 20, 2014, due 2018 to 2022	64,755	64,755
2018 Series A, 1.84% to 1.92%, issued March 26, 2018, due 2018 to 2031	50,610	-
2018 Series D, 1.45% to 1.91%, issued May 31, 2018, due 2025 to 2029	50,000	-
Total	<u>776,700</u>	<u>758,095</u>
Revolving Loan:		
2015 Series C, issued November 1, 2015, due 2021	53,000	79,000
Total	<u>4,989,715</u>	<u>5,093,431</u>
Less:		
Unamortized Bond Premiums and Discounts	391,624	398,193
Current Portion of Long-Term Debt	<u>(225,917)</u>	<u>(193,839)</u>
Total	<u>165,707</u>	<u>204,354</u>
Long-Term Debt, Net	<u>\$ 5,155,422</u>	<u>\$ 5,297,785</u>

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June 30, 2018 and 2017

(Dollars in thousands)

Long-term obligations at June 30, 2018 and 2017 consisted of the following

	2018			2018	Due
	Beginning	Additions	Reductions	Ending	Within
	Balance			Balance	One Year
General Revenue Bonds	\$ 580,035	\$ 107,580	\$ 62,100	\$ 625,515	\$ 52,665
General Revenue Refunding Bonds	3,427,945	122,510	182,135	3,368,320	107,765
General Revenue Bonds with the Massachusetts Clean Water Trust	1,006,451	565	64,136	942,880	65,487
Borrowings Associated with Derivative Instruments	39,834	-	2,940	36,894	-
Revolving Loan	79,000	-	26,000	53,000	-
Total	<u>\$ 5,133,265</u>	<u>\$ 230,655</u>	<u>\$ 337,311</u>	<u>\$ 5,026,609</u>	<u>\$ 225,917</u>
	2017			2017	Due
	Beginning	Additions	Reductions	Ending	Within
	Balance			Balance	One Year
General Revenue Bonds	\$ 650,140	\$ 68,240	\$ 138,345	\$ 580,035	\$ 55,360
General Revenue Refunding Bonds	3,552,735	359,005	483,795	3,427,945	74,340
General Revenue Bonds with the Massachusetts Clean Water Trust	1,035,797	32,994	62,340	1,006,451	64,139
Borrowings Associated with Derivative Instruments	42,774	-	2,940	39,834	-
Revolving Loan	79,000	-	-	79,000	-
Total	<u>\$ 5,360,446</u>	<u>\$ 460,239</u>	<u>\$ 687,420</u>	<u>\$ 5,133,265</u>	<u>\$ 193,839</u>

The Authority is required to establish water and sewer rates and charges at a level sufficient to provide, among other things, primary and subordinated debt service coverage ratios of 120% and 110%, respectively. For the year ended June 30, 2018, the Authority had primary and subordinated debt service coverage ratios of 192% and 120%, respectively.

Under the Authority's General Revenue Bond Resolution, all revenues, together with the investment earnings thereon, except to the extent that such earnings are required to be deposited in the Rebate Fund pursuant to a Supplemental Resolution, are pledged for payment of the Bonds.

The Act of 1984 imposes a limitation of \$600,000 on the total amount of bonds and notes which may be outstanding at any one time. The Authority has requested increases in its debt limit as necessary to allow for issuances of bonds in amounts required to finance the capital program. The state legislature increased the debt limit to \$6,450,000.

On May 31, 2018, the Authority issued direct-purchase General Revenue Refunding Bonds, 2018 Series D for \$50,000. The proceeds from these bonds were used to retire commercial paper notes.

On May 16, 2018, the Authority issued General Revenue Bonds, 2018 Series B for \$107,580 and General Revenue Refunding Bonds, 2018 Series C for \$21,900.

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The proceeds from the Series B bonds were used to finance new construction projects and to retire commercial paper notes (\$25,000) and a portion of the 2015 Series C Revolving Loan (\$26,000). The interest rate on these bonds is 3% to 5%.

The proceeds from the Series C bonds were used to refund \$24,935 of General Revenue Refunding Bonds 2006 Series B. The interest rate on these bonds is 5%. The cash flow required to make principal and interest payments on the refunding bonds is approximately \$4,426 less than the debt service requirements of the refunded bonds. The economic gain (the difference between the present values of the debt service payments on the old and new debt) obtained from this refunding is \$3,808.

On March 26, 2018, the Authority issued direct-purchase General Revenue Refunding Bonds, 2018 Series A for \$50,610. The proceeds from these bonds were used to refund in full the General Revenue Refunding Bonds, 2012 Series F.

The variable interest rate on these bonds will be based on 81.5% of LIBOR set on the first business day of each month. The monthly payment will be a combination of this variable interest and a fixed component of 37 basis points for 2018 Series A.

On May 18, 2017, the Authority issued General Revenue Bonds, 2017 Series B for \$68,240 and General Revenue Refunding Bonds, 2017 Series C for \$254,745.

The proceeds from the Series B bonds were used to finance new construction projects. The interest rate on these bonds is 5%.

The proceeds from the Series C bonds were used to refund \$202,155 of General Revenue Refunding Bonds 2005 Series A, \$75,245 of General Revenue Refunding Bonds 2005 Series B, \$21,955 of General Revenue Refunding Bonds 2008 Series A and \$6,810 of General Revenue Refunding Bonds 2012 Series F.

The interest rate on these bonds is 4% to 5%. The cash flow required to make principal and interest payments on the refunding bonds is approximately \$81,983 less than the debt service requirements of the refunded bonds. The economic gain (the difference between the present values of the debt service payments on the old and new debt) obtained from this refunding is \$60,441.

On August 24, 2016, the Authority issued General Revenue Refunding Bonds, 2016 Series D for \$104,260.

The proceeds from these bonds were used to refund \$1,000 of General Revenue Bonds 2002 Series J, \$3,795 of General Revenue Bonds 2010 Series A, \$68,625 of General Revenue Bonds 2011 Series B, \$23,495 of General Revenue Bonds 2012 Series A and \$5,600 of General Revenue Bonds 2014 Series D.

The interest rate on these bonds is 3% to 5%. The cash flow required to make principal and interest payments on the refunding bonds is approximately \$13,240 less than the debt service requirements of the refunded bonds. The economic gain (the difference between the present values of the debt service payments on the old and new debt) obtained from this refunding is \$9,796.

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On November 1, 2015, the Authority entered into a revolving credit agreement with a bank. The Authority shall repay the loan at the Commitment Termination Date, November 17, 2021, at which point the Authority can elect to convert the revolving loan into a term loan. Interest is payable at 80% of the 1 month LIBOR rate, 2.09% and 1.22% at June 30, 2018 and 2017, respectively. Initial drawdown was \$100,000, which was reduced to \$79,000 at June 30, 2016. The balance was further reduced in fiscal year 2018 to \$53,000 using the proceeds from the General Revenue Bonds, 2018 Series B.

Synthetic Fixed Rate Swap Transactions

In connection with several of its bond issues, the Authority has entered into various interest rate swap agreements to reduce the impact of changes in interest rates on its variable rate debt. Under these agreements, the Authority pays a fixed interest rate (ranging from 4.0% to 6.6%) and receives interest from the swap counterparties at a variable rate (either Securities Industry and Financial Markets Association (SIFMA) rate or a percentage of LIBOR). The SIFMA rate is based on the seven-day high-grade market index of tax-exempt variable rate demand obligations.

Item	Objective	Effective Date	Current Notional Amount	Termination Date	Fixed Payable Swap Rate	Variable Receivable Swap Rate	Fair Value at June 30,	
							2018	2017
A	Hedge changes in cash flows on the 2008 Series A Bonds	April 4, 2011	\$ 133,300	August 1, 2030	5.144%	67% LIBOR Plus 0.13%	\$ (4,764)	\$ (9,942)
B	Hedge changes in cash flows on the 2008 Series E Bonds	October 28, 2008	133,300	August 1, 2030	5.494	SIFMA	(11,284)	(17,139)
C	Hedge changes in cash flows on the 2008 Series A and 2008 Series E Bonds	August 1, 2030	70,400	August 1, 2037	6.585	67% LIBOR Plus 0.13%	(2,186)	(2,221)
D	Hedge changes in cash flows on the 2008 Series C Bonds	May 29, 2008	73,615	November 1, 2026	3.994	SIFMA	(3,380)	(6,152)
E	Hedge changes in cash flows on the 2008 Series C and 2012 Series G Bonds	May 29, 2008	49,080	November 1, 2026	4.033	SIFMA	626	(301)
Total							<u>\$ (20,988)</u>	<u>\$ (35,755)</u>

All of the above are pay-fixed interest rate swap agreements. Under these interest rate swap agreements, the Authority incurred net interest expense of \$14,676 and \$17,221 in fiscal year 2018 and fiscal year 2017, respectively.

For the swap effective on April 4, 2011, with a current notional amount of \$133,300, the fixed rate paid by the Authority is as follows: 4.120% from execution until August 2013, 5.144% from August 2013 until August 2019, and 6.585% from August 2019 until August 2030.

For the swap execution on October 28, 2008, with a current notional amount of \$133,300, the fixed rate paid by the Authority is as follows: 4.470% from execution until August 2013, 5.494% from August 2013 until August 2019, and 6.935% from August 2019 until August 2030.

The aggregate fair value balance of the derivative instruments at June 30, 2018 and 2017 is \$(20,988) and \$(35,755), respectively, and is reflected on the Authority's statements of net position as a liability for derivative instruments. This liability is offset by deferred outflows from derivative instruments. The original notional amounts of the interest rate swaps totaled \$535,895.

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The fair values of the interest rate swaps were estimated using the zero-coupon method. This method calculates the future net settlement payments required by the swap, assuming that the current forward rates implied by the yield curve correctly anticipate future spot interest rates. These payments are then discounted using the spot rates implied by the current yield curve for hypothetical zero-coupon bonds due on the date of each future net settlement on the swaps. The interest rate swaps are classified in Level 2 of the fair value hierarchy, as outlined in Government Accounting Standards Board Statement No. 72, *Fair Value Measurement and Application*, as valued using a market approach that considers benchmark interest rates.

Risk Disclosure

Credit Risk - Because all of the Authority's swaps rely upon the performance of the third parties who serve as swap counterparties, the Authority is exposed to credit risk, or the risk that a swap counterparty fails to perform according to its contractual obligations. The appropriate measurement of this risk at the reporting date is the fair value of the swaps, as shown in the columns labeled Fair Value in the tables above. To mitigate credit risk, the Authority maintains strict credit standards for swap counterparties. The Authority monitors swap counterparties' credit ratings by the three rating agencies (FitchRatings, Moody's Investors Service, and S&P Global Ratings). Collateral may be obtained from any counterparty that does not maintain a set credit rating. Since all derivatives are in a liability position, there is no amount exposed to credit risk, except for item E, which is in a positive position.

The following represents the credit ratings of the counterparties as of June 30, 2018:

<u>Derivative instrument</u>	<u>Counterparty credit rating</u>
Derivative A	A
Derivative B	AA-
Derivative C	A
Derivative D	A
Derivative E	A

Basis Risk - The Authority is exposed to basis risk because the floating index the Authority receives on the swaps (SIFMA or 67% of LIBOR) may be different than the basis of the variable rate on the associated bonds. Should this occur, the expected savings may not be realized.

Termination Risk - The Authority or its counterparties may terminate a derivative instrument if the other party fails to perform under the terms of the contract. If, at the time of termination, a derivative is in a liability position, the Authority would be liable to the counterparty for a payment equal to the liability, subject to netting arrangements.

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Rollover Risk - The Authority can be exposed to rollover risk on hedging derivative instruments that are hedges of debt that terminate prior to the maturity of the debt. The Authority currently has no rollover risk. When Derivative instruments A and B terminate in 2030, those bond series will then be hedged by Derivative instrument C.

Swap Payments and Associated Bonds Outstanding

Bonds outstanding include certain variable rate bonds where the Authority pays a fixed interest rate and receives interest at a variable rate from the counterparty. The table below presents the debt service requirements and related net swap payments for these bonds. As rates vary, variable rate interest payments will vary.

Using rates as of June 30, 2018, debt service requirements of the hedged variable rate bonds and net swap payments, assuming current interest rates remain constant, were as follows:

Fiscal Year Ending June 30:	Variable-rate		Interest Rate	Total
	Principal	Interest	Swaps, Net	
2019	\$ 26,000	\$ 4,424	\$ 12,459	\$ 42,883
2020	27,000	3,826	12,764	43,590
2021	70,400	3,081	12,212	85,693
2022	32,230	2,409	10,329	44,968
2023	67,345	1,947	8,142	77,434
2024–2028	95,920	6,338	25,142	127,400
2029–2033	5,600	3,967	15,460	25,027
2034–2038	64,800	1,603	7,732	74,135
Total	<u>\$ 389,295</u>	<u>\$ 27,595</u>	<u>\$ 104,240</u>	<u>\$ 521,130</u>

Demand Bonds

Included in variable rate long-term debt of \$831,400 is \$519,185 of subordinated variable rate demand obligations (VRDOs). The bonds were issued on various dates from 1999 through 2008. Subordinated VRDOs are subject to purchase on the demand of the holder at a price equal to principal plus accrued interest. The ability of the Authority to purchase such bonds, if not remarketed, is secured through letters of credit and standby bond purchase agreements with various nationally recognized financial institutions that expire between May 2019 and August 2022. The VRDOs are classified as long-term debt because the liquidity agreement for each series contains term out provisions that, if demand is made to repurchase the bonds, calls for a three to five year amortization to repay the bonds.

In 2014, \$114,755 of 2014 Series A and B General Revenue Refunding Bonds were issued as direct-purchase bonds, to be held by the purchaser for a specific period of time and are not subject to purchase or remarketing at the demand of the holder and therefore do not require a letter of credit or standby bond purchase agreement. The \$50,000 of Series A and \$64,755 of Series B have been purchased through May 2020 and August 2022, respectively. These bonds, in addition to 2012 Series E, F & G General Revenue Refunding Bonds, totaling \$96,850, have two to three year term out provisions beginning at the expiration date.

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At June 30, 2018, the following bonds outstanding are considered defeased in-substance:

Description	Redemption date	Redemption price	Outstanding principal amount
1992 Series A	2018-2019	100	\$ 68,765
2002 Series J	2020	100	2,100
2006 Series A	2018	100	19,385
2006 Series B	2018	100	138,585
2009 Series A	2019	100	76,445
2009 Series B	2019	100	133,170
2010 Series A	2018-2020	100	96,530
2010 Series B	2019, 2020	100	51,095
2011 Series B	2018-2021	100	125,805
2012 Series A	2018, 2020, 2022	100	55,800
2013 Series A	2018-2022	100	4,195
2014 Series D	2018-2020, 2024	100	9,545
2014 Series E	2019	100	2,950
2014 Series F	2018, 2020	100	1,145
2016 Series B	2020	100	1,360
2017 Series C	2020	100	5,245

The proceeds and available funds were deposited in irrevocable trusts with escrow agents in an amount which will provide for payment of interest due to the redemption date and redemption of the defeased bonds outstanding on such date. The defeased portion of such debt, accrued interest thereon, and related unamortized issuance and discount costs were removed from the statements of net position in an in-substance defeasance transaction.

In June 2018, the Authority used funds on hand to defease \$2,100 of the 2002 Series J, and \$1,380 of the 2014 Series D General Revenue Bonds and \$5,495 of the 2006 Series B, \$15,200 of the 2009 Series B and \$5,245 of the 2017 Series C General Revenue Refunding Bonds outstanding.

In October 2017, the Authority used funds on hand to defease \$1,390 of the 2010 Series A, \$510 of the 2011 Series B and \$1,360 of the 2016 Series B General Revenue Bonds and \$3,610 of the 2009 Series B and \$2,700 of the 2010 Series B General Revenue Refunding Bonds outstanding.

In June 2017, the Authority used funds on hand to defease \$36,250 of the General Revenue Refunding Bonds 2005 Series A bonds outstanding.

In September 2016, the Authority used funds on hand to defease \$8,475 of the General Revenue Refunding Bonds 2009 Series B bonds outstanding.

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At June 30, 2018, outstanding bonds that are redeemable before their scheduled due dates are as follows:

Description	Redemption date	Redemption price	Outstanding principal amount
2009 Series B	August 2019	100	\$ 52,890
2010 Series B	August 2020	100	66,870
2011 Series B	August 2021	100	840
2011 Series C	August 2021	100	291,160
2012 Series A	August 2022	100	69,150
2012 Series B	August 2022	100	86,775
2013 Series A	August 2023	100	46,515
2014 Series D	August 2024	100	53,885
2014 Series F	August 2024	100	93,655
2016 Series B	August 2026	100	54,775
2016 Series C	August 2026	100	610,650
2016 Series D	August 2026	100	98,425
2017 Series B	August 2020	100	2,845
2017 Series B	August 2027	100	55,775
2017 Series C	August 2027	100	114,795
2018 Series B	August 2025	100	23,940
2018 Series B	August 2028	100	75,940

The variable rate General Revenue Bonds are subject to redemption prior to maturity at the option of the Authority in whole or in part, on any interest payment date for bond Series 1999B and 2002C and on any business day for bond Series 2008A, 2008C, 2008E, 2012G, 2014A, 2014B, 2018A and 2018D, respectively. Series 2012E is subject to redemption prior to maturity on any interest payment date after November 15, 2014.

During fiscal year 2017, the Authority executed loan agreements with the Massachusetts Clean Water Trust providing for 2017 Series A Sewer and Water loans in the principal amounts of \$8,743 and \$24,816, respectively. All proceeds for these loans were received by June 30, 2017, except for \$565 of the water loans, which was received in June 2018.

Federal and Commonwealth subsidies for purposes of offsetting principal payments aggregating \$34,317 will be recognized as capital grants in aid of construction over the term of the loans.

Interest is payable semiannually on all debt, except on the commercial paper, on which interest is payable upon maturity and the General Revenue Bonds and General Revenue Refunding Bonds with variable interest rates on which interest is payable monthly. The Senior General Revenue Bonds and the General Revenue Refunding Bonds are collateralized equally and ratably by a lien and pledge on substantially all of the Authority's cash and revenues, except the operating fund.

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The subordinated debt series, including the commercial paper interest are collateralized equally and ratably by a subordinated pledge on substantially all of the Authority's revenues and cash and investments, except the operating, senior debt service, and debt service reserve funds. Premiums, discounts, issuance costs, and the excess of reacquisition price over the carrying amount of the defeased debt are being amortized over the lives of the respective issues.

The amounts of long-term debt, principal, and interest payable in future fiscal years are as follows:

Year Ending June 30:	Principal	Interest	Total
2019	\$ 225,917	\$ 205,544	\$ 431,461
2020	235,894	204,664	440,558
2021	248,976	193,096	442,072
2022	311,255	182,975	494,230
2023	287,174	169,452	456,626
2024–2028	1,389,507	668,592	2,058,099
2029–2033	1,072,471	394,460	1,466,931
2034–2038	716,731	198,991	915,722
2039–2043	476,925	48,107	525,032
2044–2048	24,865	1,013	25,878
Total	<u>\$ 4,989,715</u>	<u>\$ 2,266,894</u>	<u>\$ 7,256,609</u>

In fiscal year 2018 the Authority issued commercial paper notes of \$51,000 to finance capital expenditures. In fiscal year 2017 The Authority issued commercial paper notes of \$50,000 to refund General Revenue Refunding Bonds, 2008 Series F, in addition to \$49,000 issued in fiscal year 2016 to finance capital expenditures.

These notes are secured by \$100,000 and \$150,000 irrevocable direct-pay letters of credit which expire on December 8, 2018, and April 19, 2019, respectively. These letters of credit carry a fee of 0.65% and 0.195% per annum, respectively, on the amount available. The maximum aggregate principal amount of commercial paper which may be outstanding at any one time is \$250,000.

Commercial paper at June 30, 2018 and 2017 consisted of the following:

	2018 Beginning balance	Additions	Reductions	2018 Ending balance
0.90% Commercial Paper	\$ 50,000	\$ -	\$ 50,000	\$ -
0.94% Commercial Paper	49,000	51,000	25,000	75,000
Total	<u>\$ 99,000</u>	<u>\$ 51,000</u>	<u>\$ 75,000</u>	<u>\$ 75,000</u>
	2017 Beginning balance	Additions	Reductions	2017 Ending balance
0.90% Commercial Paper	\$ -	\$ 50,000	\$ -	\$ 50,000
0.94% Commercial Paper	-	49,000	-	49,000
0.46% Commercial Paper	49,000	-	49,000	-
Total	<u>\$ 49,000</u>	<u>\$ 99,000</u>	<u>\$ 49,000</u>	<u>\$ 99,000</u>

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(7) Accounts Receivable/Intergovernmental Loans

The Authority has entered into various interest-free loan agreements with certain member communities. Under these agreements, the Authority loaned these communities \$41,317 and \$35,550 in fiscal years 2018 and 2017, respectively, to be received in five or ten equal annual installments.

The long-term portion of these loans at June 30, 2018 and 2017 is \$133,871 and \$123,725, respectively, and is included in other assets. The loans due within one year total \$31,254 and \$30,579 at June 30, 2018 and 2017, respectively. This program is designed to assist member communities with sewer and water systems rehabilitation.

(8) Capital Assets

Capital assets at June 30, 2018 and 2017 consisted of the following:

	<u>2017</u>	<u>Additions</u>	<u>Disposals/ transfers</u>	<u>2018</u>
Capital assets not being depreciated:				
Land	\$ 29,873	\$ 5	\$ -	\$ 29,878
Construction in progress	127,423	110,252	(57,150)	180,525
Total capital assets not being depreciated	<u>157,296</u>	<u>110,257</u>	<u>(57,150)</u>	<u>210,403</u>
Capital assets being depreciated:				
Plant and equipment – water and sewage system	9,668,357	62,433	-	9,730,790
Furniture and fixtures	17,543	-	-	17,543
Leasehold improvements	2,423	-	-	2,423
Motor vehicles and equipment	8,898	1,035	-	9,933
Total capital assets being depreciated	<u>9,697,221</u>	<u>63,468</u>	<u>-</u>	<u>9,760,689</u>
Less: accumulated depreciation for:				
plant and equipment – water and sewage system	3,809,141	190,852	-	3,999,993
Furniture and fixtures	17,330	81	-	17,411
Leasehold improvements	2,132	12	-	2,144
Motor vehicles and equipment	2,500	694	-	3,194
Total accumulated depreciation	<u>3,831,103</u>	<u>191,639</u>	<u>-</u>	<u>4,022,742</u>
Total capital assets being depreciated, net	<u>5,866,118</u>	<u>(128,171)</u>	<u>-</u>	<u>5,737,947</u>
Total capital assets, net	<u>\$ 6,023,414</u>	<u>\$ (17,914)</u>	<u>\$ (57,150)</u>	<u>\$ 5,948,350</u>

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Capital assets at June 30, 2017 and 2016 consisted of the following:

	<u>2016</u>	<u>Additions</u>	<u>Disposals/ transfers</u>	<u>2017</u>
Capital assets not being depreciated:				
Land	\$ 29,868	\$ 5	\$ -	\$ 29,873
Construction in progress	115,758	102,088	(90,423)	127,423
Total capital assets not being depreciated	<u>145,626</u>	<u>102,093</u>	<u>(90,423)</u>	<u>157,296</u>
Capital assets being depreciated:				
Plant and equipment – water and sewage system	9,576,517	91,840	-	9,668,357
Furniture and fixtures	17,508	35	-	17,543
Leasehold improvements	2,423	-	-	2,423
Motor vehicles and equipment	7,423	1,475	-	8,898
Total capital assets being depreciated	<u>9,603,871</u>	<u>93,350</u>	<u>-</u>	<u>9,697,221</u>
Less: accumulated depreciation for:				
plant and equipment – water and sewage system	3,620,166	188,975	-	3,809,141
Furniture and fixtures	17,234	96	-	17,330
Leasehold improvements	2,120	12	-	2,132
Motor vehicles and equipment	1,887	613	-	2,500
Total accumulated depreciation	<u>3,641,407</u>	<u>189,696</u>	<u>-</u>	<u>3,831,103</u>
Total capital assets being depreciated, net	<u>5,962,464</u>	<u>(96,346)</u>	<u>-</u>	<u>5,866,118</u>
Total capital assets, net	<u>\$ 6,108,090</u>	<u>\$ 5,747</u>	<u>\$ (90,423)</u>	<u>\$ 6,023,414</u>

Depreciation and amortization for fiscal years 2018 and 2017 was \$202,799 and \$201,481, respectively.

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(Dollars in thousands)

(9) Leases

Operating

The Authority leases electrical power assets, office space in Boston, and other property under long-term operating leases. Future minimum rental payments required under operating leases having initial or remaining non-cancelable lease terms in excess of one year at June 30, 2018 are as follows:

<u>Year Ending June 30:</u>	<u>Amount</u>
2019	\$ 3,036
2020	5,989
2021	11,152
2022	12,370
2023	10,314
2024–2027	35,488
Total	<u>\$ 78,349</u>

Rental expense was \$4,638 and \$4,220 in fiscal years 2018 and 2017, respectively.

Capital

In fiscal year 2002, the Authority entered into a 30-year capital lease agreement for the new maintenance facility. The interest rate for the capital lease is 7.83%. Future minimum lease payments for the capital lease at June 30, 2018 are as follows:

<u>Year Ending June 30:</u>	<u>Principal</u>	<u>Interest</u>	<u>Total</u>
2019	\$ 1,126	\$ 2,091	\$ 3,217
2020	1,217	2,000	3,217
2021	1,316	1,901	3,217
2022	1,423	1,794	3,217
2023	1,538	1,679	3,217
2024–2028	9,778	6,307	16,085
2029–2032	10,821	1,779	12,600
Total	<u>\$ 27,219</u>	<u>\$ 17,551</u>	<u>\$ 44,770</u>

Under this lease, the Authority is also responsible for “Additional Rent,” as defined in the lease. The Additional Rent includes real estate taxes, assessments, and other government charges.

The associated capital asset is reported in plant and equipment – water and sewage system at a cost of \$37,134 with \$19,806 of accumulated depreciation as of June 30, 2018.

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(10) Retirement Benefits

(a) Plan Description

The Enabling Act provided for the establishment of the Massachusetts Water Resources Authority Employees' Retirement System (the Plan), a contributory single-employer retirement system that is separate from the State Employees Retirement System. The Plan is a defined benefit pension plan covering those employees not employed by the MDC prior to July 1, 1985. Complete financial statements for the Plan can be obtained from the Authority's administrative offices at Charlestown Navy Yard, 100 First Avenue, Boston, MA 02129.

(b) Benefits Provided

The Plan provides retirement, disability and death benefits. 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.

All MDC personnel who became employees of the Authority on July 1, 1985, and were members of the State Employees Retirement System, retained their membership in that system. The Authority is not liable for retirement allowances paid to or on account of these employees. Funding of the pension liability of the State Employees Retirement System is the obligation of the Commonwealth. Employees covered by this plan become 100% vested after 10 years of service.

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(c) Employees Covered by Benefit Terms

At December 31, 2017 (the date of the Plan's latest actuarial valuation), the following employees were covered by the benefit terms:

Retired Participants and Beneficiaries Receiving Benefits	582
Inactive Participants Entitled to a Return of their Employee Contributions	64
Inactive Participants with a Vested Right to a Deferred or Immediate Benefit	42
Active Participants	<u>1,100</u>
Total	<u><u>1,788</u></u>

(d) Contributions

Contributions made by employees are based upon a percentage of employee base pay (5% for employees hired before December 31, 1974, 7% for employees hired between January 1, 1975 and December 31, 1983, 8% for employees hired between December 31, 1983, and June 30, 1996, and 9% for employees hired after July 1, 1996). Additionally, certain employees earning in excess of \$30 contribute an extra 2% of their salary effective January 1, 1979. Employees receive full payment of contributions upon withdrawal from the Plan and 50% of interest earned for employees with five to nine years of service or 100% of interest earned for employees with 10 or more years of service.

The Authority's 2018 and 2017 contributions to the plan were based on an amount approved by the Retirement Board and the Authority's board of directors, which is based on an actuarially determined amount. The Authority's Enabling Act requires funding to be made in accordance with the Retirement Board's recommendation. In fiscal year 2018 the Authority made a \$3.3 million required contribution. In fiscal year 2017 the Authority made a \$3.1 million required contribution and an additional \$1.5 million optional contribution.

(e) Net Pension Liability

The Plan's net pension liability was measured as of December 31, 2017 and 2016. The total pension liability as of December 31, 2017 was determined by an actuarial valuation as of those dates.

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Actuarial assumptions: The total pension liability in the January 1, 2018 actuarial valuation was determined using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	3%
Salary Increases	Based on years of service, starting at 5.75% at 0 years of service decreasing to 4% after 9 years of service
Investment Rate of Return	7.50%
Cost of Living Adjustments	3% of first \$13,000
Mortality Rates:	
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 one year projected generationally with Scale MP-2017

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Rates of returns on investments: 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 Plan's target asset allocation are summarized as follows:

<u>Asset Class</u>	<u>Target Allocation (%)</u>	<u>Long-Term Expected Rate of Return (%)</u>	
		<u>December 31, 2017</u>	<u>December 31, 2016</u>
Domestic Equity	21%	6.15	6.44
International Equity	19	7.11 - 9.41	7.40 - 9.42
Real Estate	7	4.9	5
Private Equity	9	10.28	10.47
Hedge Funds	23	3.94	3.75
Fixed Income	<u>21</u>	1.68 - 4.13	2.02 - 4.43
Total	<u><u>100%</u></u>		

(f) Discount Rate

The discount rate used to measure the total pension liability was 7.50%. 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 the Authority contributions will be made at rates equal to the actuarially determined contribution rates. Based on those assumptions, the 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.

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(g) Changes in the Net Pension Liability

	Increase (Decrease)		
	Total Pension Liability	Plan Fiduciary Net Position	Net Pension Liability
	(a)	(b)	(a) - (b)
Balances at June 30, 2016	<u>\$ 473,333</u>	<u>\$ 444,584</u>	<u>\$ 28,749</u>
Changes for the Year:			
Service Cost	11,080	-	11,080
Interest	36,917	-	36,917
Differences Between Expected and actual experience	(9,143)	-	(9,143)
Contributions - employer	-	4,633	(4,633)
Contributions - employee	-	8,757	(8,757)
Net investment income	-	24,183	(24,183)
Benefit payments	(16,129)	(16,129)	-
Administrative expenses	-	(426)	426
Changes of assumptions	13,298	-	13,298
Changes of benefit terms	2,050	-	2,050
Net changes	<u>38,073</u>	<u>21,018</u>	<u>17,055</u>
Balances at June 30, 2017	511,406	465,602	45,804
Changes for the year:			
Service cost	11,308	-	11,308
Interest	38,520	-	38,520
Differences between expected and actual experience	(146)	-	(146)
Contributions - employer	-	3,277	(3,277)
Contributions - employee	-	9,091	(9,091)
Net investment income	-	70,517	(70,517)
Benefit payments	(18,222)	(18,222)	-
Administrative expenses	-	(447)	447
Changes of assumptions	7,977	-	7,977
Net changes	<u>39,437</u>	<u>64,216</u>	<u>(24,779)</u>
Balances at June 30, 2018	<u>\$ 550,843</u>	<u>\$ 529,818</u>	<u>\$ 21,025</u>

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(h) Sensitivity of the Net Pension Liability (Asset) to Changes in the Discount Rate

The following presents the net pension liability (asset), calculated using the discount rate of 7.50%, as well as what the net pension liability (asset) would be if it were calculated using a discount rate that is 1-percentage-point lower (6.50%) or 1-percentage-point higher (8.50%) than the current rate:

	<u>1% Decrease (6.50%)</u>	<u>Current Discount (7.50%)</u>	<u>1% Increase (8.50%)</u>
Net pension liability (asset) as of June 30, 2018	<u>\$ 89,971</u>	<u>\$ 21,025</u>	<u>\$ (37,437)</u>

(i) Pension Expense and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

For the year ended June 30, 2018, the Authority recognized pension expense of \$12,408 and reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	<u>Deferred Outflow of Resources</u>	<u>Deferred Inflow of Resources</u>
Differences between expected and actual experience	\$ -	\$ (9,010)
Changes of assumptions	17,154	-
Net difference between projected and actual earnings on pension plan investments	<u>-</u>	<u>(5,953)</u>
Total	<u>\$ 17,154</u>	<u>\$ (14,963)</u>

Amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows:

<u>Year Ending June 30:</u>	<u>Amount</u>
2019	\$ 5,909
2020	3,284
2021	(3,139)
2022	(5,169)
2023	<u>1,306</u>
Total	<u>\$ 2,191</u>

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(11) Other Postemployment Benefits (OPEB)

(a) Plan Description

In addition to providing the pension benefits described, the Authority provides postemployment health care and life insurance benefits for retired employees through the Group Insurance Commission (GIC). The GIC is a quasi-independent state agency that administers an agent multi-employer defined benefit OPEB plan. The benefits, benefit levels, employee contributions and employer contributions are governed by the Authority and can be amended by the Authority. The plan does issue a separate financial report that can be obtained by contacting the Massachusetts Water Resources Authority, Finance Division, 100 First Avenue, Boston, MA 02129.

In April, 2015, the Authority established the MWRA Other Post-Employment Benefits (OPEB) Irrevocable Trust. The Trust was established for the sole purpose of providing for the advance funding of future costs of retired employee health insurance and other benefits provided to retirees. An initial deposit of \$10.8 million was made to the trust upon establishment of the trust. The balance of the trust was \$29.8 million and \$22.8 million at June 30, 2018 and June 30, 2017, respectively.

(b) Plan Membership

At June 30, 2018 plan membership consisted of the following:

Inactive plan members or beneficiaries currently receiving benefits	746
Inactive plan members entitled to but not yet receiving benefits	41
Active plan members	<u>960</u>
Total	<u><u>1,747</u></u>

(c) Benefits Provided

The Authority provides medical, prescription drug, mental health/substance abuse and life insurance to retirees and their covered dependents. All active employees who retire from the Authority and meet the eligibility criteria will receive these benefits.

(d) Contributions

Retirees who retired on or before July 1, 1994 contribute 10% of the cost of the health plans, as determined by the GIC. Those who retired after July 1, 1994 contribute 15% of the cost of the health plan and those who retired after October 1, 2009 contribute 20% of the cost of the health plan, as determined by the GIC. The Authority contributes the remainder of the health plan costs on a pay-as-you-go basis.

MASSACHUSETTS WATER RESOURCES AUTHORITY

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June 30, 2018 and 2017

(Dollars in thousands)

(e) *Investments*

Investment policy. The assets are invested by the Trust with the Commonwealth of Massachusetts Pension Reserves Investment Trust (PRIT) fund. The Trust's Board of Trustees may vote to approve a different investment vehicle, at its discretion. The following was the PRIT fund's asset allocation at June 30, 2018:

<u>Asset Class</u>	<u>Target Allocation (%)</u>
Global Equity	39 %
Fixed Income	22
Private Equity	12
Real Estate	10
Other	<u>17</u>
Total	<u><u>100 %</u></u>

Concentrations. No investment in any one organization represented 5% or more of the Trust's fiduciary net position.

Rate of return. For the year ended June 30, 2018 and 2017, the annual money-weighted rate of return on investments, net of investment expense was 8.58% and 10.58%, respectively. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for changing amounts actually invested.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

(f) Changes in the Net OPEB Liability

	Increase (Decrease)		
	Total OPEB Liability	Plan Fiduciary Net Position	Net OPEB Liability
	(a)	(b)	(a) - (b)
Balances at June 30, 2017	<u>\$ 154,254</u>	<u>\$ 22,782</u>	<u>\$ 131,472</u>
Changes for the year:			
Service cost	2,820	-	2,820
Interest	10,821	-	10,821
Differences between expected and actual experience	(11,860)	-	(11,860)
Contributions - employer	-	10,093	(10,093)
Net investment income	-	1,956	(1,956)
Benefit payments	<u>(5,057)</u>	<u>(5,057)</u>	<u>-</u>
Net changes	<u>(3,276)</u>	<u>6,992</u>	<u>(10,268)</u>
Balances at June 30, 2018	<u>\$ 150,978</u>	<u>\$ 29,774</u>	<u>\$ 121,204</u>

Actuarial assumptions. The total OPEB liability was determined by an actuarial valuation as of January 1, 2018, and update procedures were used to roll forward the total OPEB liability to June 30, 2018. The following actuarial assumptions, applied to all periods included in the measurement, unless otherwise specified:

Inflation	3.0%
Salary increases	5.75%, decreasing over 9 years to an ultimate of 4.0%
Investment rate of return	7.0%, net of OPEB plan investment expense, including inflation
Healthcare cost trend rates	8.0% for 2018, decreasing 0.5% per year to an ultimate rate of 5.0%

Mortality rates were based on the RP-2014 Blue Collar Mortality Table for Employees projected using generational mortality and scale MP-2017 for active employees, the RP-2014 Blue Collar Mortality Tables for Healthy Annuitants projected using generational mortality and scale MP-2017 for retirees and the RP-2014 Blue Collar Mortality Tables for Healthy Annuitants projected using generational mortality and scale MP-2017 set forward one year for the disabled.

MASSACHUSETTS WATER RESOURCES AUTHORITY

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June 30, 2018 and 2017

(Dollars in thousands)

The long-term expected rate of return on OPEB 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 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 target asset allocation as of June 30, 2018 (see discussion of the Trust's investment policy) are summarized in the following table:

<u>Asset Class</u>	<u>Long-Term Expected Real Rate of Return</u>
Global Equity	6.15 - 9.41%
Fixed Income	1.68 - 4.13
Private Equity	10.28
Real Estate	4.9
Other	3.94 - 4.71

Discount rate. The discount rate used to measure the total OPEB liability was 7.0%. The projection of cash flows used to determine the discount rate assumed that Authority contributions will be made at rates equal to the actuarially determined contribution rates. Based on those assumptions, the OPEB 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 OPEB plan investments was applied to all periods of projected benefit payments to determine the total OPEB liability. The discount rate used in the prior actuarial valuation was 7.0%.

Sensitivity of the net OPEB liability to changes in the discount rate. The following presents the net OPEB liability of the Authority, as well as what the Authority's net OPEB liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.0%) or 1-percentage-point higher (8.0%) than the current discount rate:

	<u>1% Decrease (6.0%)</u>	<u>Discount Rate (7.0%)</u>	<u>1% Increase (8.0%)</u>
Net OPEB Liability	<u>\$ 142,517</u>	<u>\$ 121,204</u>	<u>\$ 103,608</u>

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Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

Sensitivity of the net OPEB liability to changes in the healthcare cost trend rates. The following presents the net OPEB liability of the Authority, as well as what the Authority's net OPEB liability would be if it were calculated using healthcare cost trend rates that are 1-percentage-point lower (7.0%) or 1-percentage-point higher (9.0%) than the current healthcare cost trend rates:

	<u>1% Decrease</u> <u>(7.0% - 4.0%)</u>	<u>Base Rate</u> <u>(8.0% - 5.0%)</u>	<u>1% Increase</u> <u>(9.0% - 6.0%)</u>
Net OPEB Liability	<u>\$ 98,898</u>	<u>\$ 121,204</u>	<u>\$ 146,968</u>

(g) OPEB Expense and Deferred Outflows of Resources and Deferred Inflows of Resources Related to OPEB

For the year ended June 30, 2018, the Authority recognized OPEB expense of \$9,856 and reported deferred outflows of resources and deferred inflows of resources related to OPEB from the following sources:

	<u>Deferred Outflow</u> <u>of Resources</u>	<u>Deferred Inflow</u> <u>of Resources</u>
Differences between expected and actual experience	\$ -	\$ (9,884)
Net difference between projected and actual earnings on pension plan investments	<u>-</u>	<u>(148)</u>
Total	<u>\$ -</u>	<u>\$ (10,032)</u>

Amounts reported as deferred outflows of resources and deferred inflows of resources related to OPEB will be recognized in OPEB expense as follows:

<u>Year Ending June 30:</u>	<u>Amount</u>
2019	\$ (2,014)
2020	(2,014)
2021	(2,014)
2022	(2,014)
2023	<u>(1,976)</u>
Total	<u>\$ (10,032)</u>

(h) Annual OPEB Costs and Net OPEB Obligation under GASB No. 45

The Authority's fiscal year 2017 annual OPEB expense is calculated based on the annual required contribution of the employer (ARC), an amount actuarially determined in accordance with the parameters of GASB Statement No. 45. The ARC represents a level of funding that, if paid on an ongoing basis, is projected to cover the normal cost per year and amortize the unfunded actuarial liability over a period of thirty years.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

The following table shows the components of the Authority's annual OPEB cost for the year ended June 30, 2017, the amount actually contributed to the plan, and the change in the Authority's net OPEB obligation based on an actuarial valuation as of January 1, 2016:

Annual required contribution (ARC)	\$ 10,948
Interest on net OPEB obligation	7,485
Adjustment to ARC	<u>(5,869)</u>
 Annual OPEB cost	 12,564
Contributions made	<u>(9,116)</u>
 Increase in net OPEB obligation	 3,448
Net OPEB obligation – beginning of year	<u>106,927</u>
 Net OPEB obligation – end of year	 <u><u>\$ 110,375</u></u>

The Authority's annual OPEB cost, the percentage of annual OPEB cost contributed to the plan, and the net OPEB obligation were as follows:

<u>Fiscal Year Ended</u>	<u>Annual OPEB Cost</u>	<u>Percentage of OPEB Cost Contributed</u>	<u>Net OPEB Obligation</u>
2017	\$ 12,564	73%	\$ 110,375
2016	16,134	61	106,927
2015	15,692	95	100,597

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

Funded Status and Funding Progress

The funded status of the plan as of January 1, 2016, the date of the most recent actuarial valuation, was as follows:

Actuarial accrued liability (AAL)	\$ 131,430
Actuarial value of plan assets	<u>(10,827)</u>
Unfunded actuarial accrued liability (UAAL)	<u>\$ 120,603</u>
Funded ratio (actuarial value of plan assets/AAL)	8.2%
Covered payroll (active plan members)	\$ 96,118
UAAL as a percentage of covered payroll	125.5%

Actuarial valuations of an ongoing plan involve estimates of the value of reported amount and assumptions about the probability of occurrence of events far into the future. Examples included assumptions about future employment, mortality, and the healthcare cost trend. Amounts determined regarding the funded status of the plan and the annual required contributions of the employer are subject to continual revision as actual results are compared with past expectations and new estimates are made about the future. The schedule of funding progress, presented as required supplementary information following the notes to the financial statements, presents multiyear trend information that shows whether the actuarial value of plan assets is increasing or decreasing over time relative to the actuarial accrued liabilities for benefits.

Actuarial Methods and Assumptions

Projections of benefits for financial reporting purposes are based on the plan as understood by the Authority and the plan members and include the types of benefits provided at the time of each valuation and the historical pattern of sharing of benefit costs between the Authority and plan members to that point. The actuarial methods and assumptions used include techniques that are designed to reduce short-term volatility in actuarial accrued liabilities and the actuarial value of assets, consistent with the long-term perspective of the calculations.

In the January 1, 2016 actuarial valuation, the projected unit credit cost method was used. The actuarial value of assets was \$10.8 million. The actuarial assumptions included a 7.0% investment rate of return and an initial annual healthcare cost trend rate of 9.5% which decreases to a 5.5% long-term trend rate for all healthcare benefits after ten years. The amortization costs for the initial UAAL is a level percentage of payroll for a period of 30 years, on an open basis. This has been calculated assuming the amortization payment increases at a rate of 3%.

(12) Commitments and Contingencies

(a) General

The Authority's capital improvement program continues to proceed. As part of this program, the Authority has entered into a number of contracts for the design and construction of infrastructure and improvements to its facilities. Commitments under these contracts aggregated approximately \$641,080 at June 30, 2018.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

The Authority's operating and construction plans are designed to comply with the Federal District Court's schedule of actions. The Authority has incurred capital expenditures of approximately \$11,400,000 from fiscal years 1986 through 2018, including those projects required to comply with the Federal District Court's schedule. The Authority anticipates spending an additional \$1,308,350 on these projects through fiscal year 2023. These capital expenditures have been forecasted based upon certain preliminary assumptions and estimates, which may change significantly as design and construction of the necessary facilities proceed. Funding is expected to come from various federal and state grants, as available and approved, and from the Authority's debt proceeds. To date, federal appropriations for the Boston Harbor Project have aggregated \$810,000.

(b) Boston Harbor Case

The Authority continues to be a defendant, along with Boston Water and Sewer Commission (BWSC) and the Commonwealth, in the federal Boston Harbor Case. The federal action was originally brought in 1985 by the United States on behalf of the United States Environmental Protection Agency (EPA) and by certain citizens' groups for Clean Water Act violations. As part of the Boston Harbor Case, the Authority was required to undertake certain corrective actions to meet wastewater treatment, discharge and combined sewer overflow (CSO) requirements, including the completion of new and improved primary and secondary treatment facilities at Deer Island. Beyond these major improvements to its wastewater treatment capabilities, the Authority also was required to improve water quality in the Alewife Brook and Charles and Mystic Rivers by its adoption of a Long Term CSO Control Plan which was comprised of 35 projects, the last three of which were completed on time by the close of calendar year 2015. In March 2016 the federal district court formally received the Authority's 2015 annual CSO project report, officially noting completion of all Plan projects.

In March 2006, the Authority reached agreement with the United States and the Massachusetts Department of Environmental Protection (DEP) on the scope and schedule for the remaining CSO projects which was filed with the Court as part of a joint motion to amend the Court Schedule. In April 2006, the Court allowed the joint motion and issued an Order with a schedule. Under the Order, the Authority now has a three-year performance assessment period, from 2018 through 2020, to conduct analyses which will compare project benefits of the CSO program against actual performance results and to report those findings to the district court.

As part of the agreement, DEP agreed to reissue and EPA agreed to approve five (5) consecutive variances of no more than three years duration each, through the year 2020, for the Charles River and Alewife Brook/Upper Mystic River that are consistent with and limited to the requirements in the Authority's revised Long Term CSO Control Plan. Variances have most recently been issued by DEP in or about August 2016. The variances will respectively remain in place for the Charles River until September 1, 2019 and for the Alewife/Upper Mystic until September 1, 2019. In addition, the United States and the Authority agreed to withdraw the February 27, 1987 *Stipulation of the United States and the Massachusetts Water Resources Authority on Responsibility and Legal Liability for Combined Sewer Overflows* and replace it with a Second Stipulation that requires the Authority to implement the CSO requirements set forth in the Court Schedule and to meet the levels of control described in the Authority's long term CSO Control Plan. Once these performance parameters have been reached, the Second Stipulation makes the Authority responsible for only those CSO outfalls which it owns and operates.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

There has been no imposition of penalties by the Court against MWRA on the merits of the claims originally asserted in the Boston Harbor Case to date. The Court always retains the right to order remedial action and to assess penalties.

(c) Deer Island Submarine Power Cable

In 2004, the United States Army Corps of Engineers (Corps) notified Boston Edison Co. (NStar), its subsidiary Harbor Energy Electric Company (HEEC), and the Authority of allegations that each, as permittees, were in violation of certain depth requirements contained in a permit (MA BOSS 198900530, dated August 31, 1989) which authorized the installation of a submarine electric power cable running under the channel bed of Boston Harbor extending from South Boston to Deer Island, used to provide electric power for Deer Island operations. The Corps alleges that the power cable, in places, has been installed at depths less than those required by the permit and would eventually interfere with a project of harbor dredging known as the Boston Harbor Deep Draft Navigation Improvement Project (the “Project”) which will allow deep-draft cargo vessels to dock in Boston Harbor.

MWRA’s position is that it is not the owner of the cable, that it was not involved in the planning, design, location or installation of the cable, that it had no meaningful knowledge, participation in or control over the misplacement of the cable and therefore should have no legal responsibility to move it or relocate it. MWRA has also maintained that its status as a “permittee” in the Corps’ permit differs substantially from that of NSTAR and HEEC as the former merely lent its name to an application for the permit solely because it would allow permit review by the Corps to be expedited. The cable is vitally important to MWRA as it provides the primary means by which electricity is delivered to Deer Island to power its wastewater operations.

Settlement Efforts

Efforts to resolve the dispute concerning compliance with the permit and responsibility for the cable protection costs date back to approximately 2005. Discussions during these prior years among the interested parties over the years produced only a proposed method intended by NSTAR and HEEC for protection of the cable from the Project which would have entailed carefully exposing the cable, placing concrete mats over it followed by backfilling of sediments over both the cable and mats without either moving it or burying the cable deeper in the channel. The Authority has consistently advised NSTAR and HEEC that it has and will accept no financial responsibility whatsoever for the costs of either protecting or relocating the cable.

Litigation and Conditional Settlement

United States of America v. NSTAR Electric Company d/b/a Eversource Energy, Harbor Electric Energy Co., and Massachusetts Water Resources Authority, U.S. District Court, District of Massachusetts, C.A. No. 16-11470-RGS As a result of the need to achieve even deeper dredging depths than the Army Corps had initially recommended in 2016 and the likelihood that those depths might not be practicably reachable especially in light of the addition of the proposal to add protective concrete mats, the United States, acting on behalf of the Corps, commenced a lawsuit in July 2016 in the federal district court in Boston against MWRA, NSTAR and HEEC under the Rivers and Harbors Act and under the Clean Water Act asking the federal district court to determine the permittees’ non-compliance with the 1990 permit and to assess penalties for the

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

obstruction caused by the mis-located cable in two shipping channels of Boston Harbor. In that lawsuit, the Corps also asked that MWRA, NSTAR and HEEC, each named as permittees under the permit, be enjoined from further maintaining the cable in its present location. MWRA filed its Answer to the Complaint, including cross claims against co-defendants NSTAR and HEEC, in August 2016. Following a failed motion to dismiss both the Complaint and MWRA's cross-claims, NSTAR and HEEC eventually filed their Answer to the Complaint and cross-claimed against MWRA upon a theory of indemnification that MWRA had the primary obligation as the sole customer of the cable to pay any and all expenses necessary to correct the location of the cable improperly installed by HEEC.

Resolution of the federal court litigation was conditionally accomplished over the period of May through July 2017 when it became imperative that the Corps be able to determine whether it would be able to save the federal appropriation dollars for the Project without the aid of or reliance upon the federal court's enforcement powers. The first component of this recent resolution was the negotiation and execution of an agreement among MWRA, NSTAR and HEEC of an agreement whereby HEEC will provide MWRA with a new 115 kV power cable over a different cross-harbor route by December 31, 2019.

The second component of the conditional resolution of the federal court lawsuit involves the entry of a Stipulation and Order in the federal lawsuit by the parties and the Court in July 2017 which, inter alia, compels NSTAR and HEEC, but not MWRA, to be responsible for all costs and efforts toward the design and installation, by the end of calendar year 2019 inclusive of all permitting, of the new 115 kV power cable along a new route to serve MWRA's power distribution needs at its Deer Island facility. NSTAR and HEEC, but not MWRA, have further agreed to de-energize and decommission the existing non-compliant power cable by February 2020 and remove from the harbor channels portions of the old cable by May 2020. The Order includes the potential assessment of stipulated penalties and/or actual delay damages against NSTAR and HEEC, but not MWRA, for failure without good cause to meet those milestones, the completion of which are necessary to allow the harbor and shipping channel-deepening Project to move forward. MWRA will not be a permittee with respect to the new Corps permit and satisfaction of HEEC and NSTAR's obligations regarding the installation of the new cable will preclude the Corps from any further enforcement of its 1990 permit against MWRA. All claims of all parties to the federal court lawsuit have been stayed pending satisfaction of the obligations of HEEC and NSTAR under the Stipulation and Order. Completion of all obligations under the Stipulation and Order will result in the eventual dismissal with prejudice of all such claims.

(d) Miscellaneous

The Authority is also a defendant in several legal actions and administrative proceedings arising out of its operation, maintenance, and improvement of the water and sewer systems under its care. It is the opinion of management that any judgments or settlements that may result from these actions will not have a materially adverse effect upon the Authority.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Notes to Financial Statements

June 30, 2018 and 2017

(Dollars in thousands)

(13) Risk Management

The Authority is exposed to various risks of loss. The risk management program involves insurance and self insurance related to property, general liability (including automobile, marine and employers' liability), excess liability, public officials' liability, workers' compensation, unemployment liability, and employee health care and life insurance.

Buildings, plants, and equipment are fully insured on an all risk replacement basis to the extent that losses exceed \$2,500 per occurrence, up to a limit of \$300,000. The Authority maintains insurance coverage for general liability, automobile liability, marine liability, and employers' liability to the extent that losses exceed \$2,500 per occurrence, up to a limit of \$25,000. In addition to the primary liability insurance, the Authority maintains excess liability policies with additional limits of \$75,000. The Authority also maintains public officials' liability insurance with a limit of \$5,000 per occurrence with a \$1,000 deductible. All insurance policies are renewed on an annual basis.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Schedules of Employer Contributions – Last Ten Years

Required Supplementary Information– GASB No. 68

(Unaudited)

(Dollars in Thousands)

	Fiscal year ended June, 30									
	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Actuarially Determined Contribution	\$ 3,277	\$ 3,133	\$ 8,159	\$ 7,808	\$ 5,919	\$ 5,766	\$ 5,512	\$ 5,343	\$ 5,621	\$ 5,334
Contributions in Relation to the Actuarially Determined Contribution	<u>3,277</u>	<u>4,633</u>	<u>8,159</u>	<u>12,629</u>	<u>12,447</u>	<u>10,490</u>	<u>7,363</u>	<u>5,343</u>	<u>5,621</u>	<u>8,630</u>
Contribution Deficiency (Excess)	<u>\$ -</u>	<u>\$ (1,500)</u>	<u>\$ -</u>	<u>\$ (4,821)</u>	<u>\$ (6,528)</u>	<u>\$ (4,724)</u>	<u>\$ (1,851)</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ (3,296)</u>
Covered Payroll	\$ 92,975	\$ 89,755	\$ 89,169	\$ 88,646	\$ 84,829	\$ 84,829	\$ 82,870	\$ 82,870	\$ 81,962	\$ 82,314
Contributions as a Percentage of Covered Payroll	<u>3.52%</u>	<u>5.16%</u>	<u>9.15%</u>	<u>14.25%</u>	<u>14.67%</u>	<u>12.37%</u>	<u>8.89%</u>	<u>6.45%</u>	<u>6.86%</u>	<u>10.48%</u>

Notes to Required Supplementary Information

Valuation Date	Actuarial determined contributions for fiscal 2017 and 2018 are determined with the January 1, 2015 actuarial valuation.
Actuarial Cost Method	Entry age normal
Amortization Method	Payments increase at 4.5% per year
Remaining Amortization Period	9 years from July 1, 2015
Asset Valuation Method	Market value of assets as reported in the Plan's annual statement less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 10% of the market value.

Actuarial Assumptions:

Investment Rate of Return	7.75%
Discount Rate	7.75%
Inflation Rate	4.00%
Projected Salary Increases	Based on years of service, ranging from 6% at 0 years of service decreasing to 4.25% after 9 years of service.
Cost of Living Adjustments	3% on first \$13,000

Plan Membership:

Retired Participants and Beneficiaries	
Receiving Benefits	476
Inactive Participants Entitled to a Return of their Employee Contributions	47
Inactive Participants with a Vested Right to a Deferred or Immediate Benefit	48
Active Participants	<u>1,090</u>
Total	<u><u>1,661</u></u>

See accompanying independent auditors' report

MASSACHUSETTS WATER RESOURCES AUTHORITY

Schedules of Changes in the Employer's Net Pension Liability and Related Ratios – Last Ten Years

Required Supplementary Information– GASB No. 68

(Unaudited)

(Dollars in Thousands)

	Measurement Date			
	December 31,			
	2017	2016	2015	2014
Total Pension Liability:				
Service cost	\$ 11,308	\$ 11,080	\$ 10,638	\$ 10,529
Interest	38,520	36,917	34,598	33,587
Differences between expected and actual experience	(146)	(9,143)	-	(8,380)
Changes of assumptions	7,977	13,298	-	4,921
Changes of benefit terms	-	2,050	-	-
Benefit payments, including refunds of employee contributions	(18,222)	(16,129)	(15,390)	(12,963)
Net change in total pension liability	39,437	38,073	29,846	27,694
Total pension liability - beginning	511,406	473,333	443,487	415,793
Total pension liability - ending	<u>\$ 550,843</u>	<u>\$ 511,406</u>	<u>\$ 473,333</u>	<u>\$ 443,487</u>
Plan Fiduciary Net Position:				
Contributions - employer	\$ 3,277	\$ 4,633	\$ 8,159	\$ 12,630
Contributions - employee	9,091	8,757	8,402	8,245
Net investment income	70,517	24,183	(530)	20,484
Benefit payments, including refunds of employee contributions	(18,222)	(16,129)	(15,390)	(12,963)
Administrative expenses	(447)	(426)	(412)	(408)
Other - military service fund contribution	-	-	-	16
Net change in fiduciary net position	64,216	21,018	229	28,004
Plan fiduciary net position - beginning	465,602	444,584	444,355	416,351
Plan fiduciary net position - ending	<u>\$ 529,818</u>	<u>\$ 465,602</u>	<u>\$ 444,584</u>	<u>\$ 444,355</u>
Net Pension Liability (Asset) - Ending	\$ 21,025	\$ 45,804	\$ 28,749	\$ (868)
Plan's Fiduciary Net Position as a				
Percentage of the Total Pension Liability	96.18%	91.04%	93.93%	100.20%
Covered Payroll	\$ 92,975	\$ 89,755	\$ 89,169	\$ 88,646
Net Pension Liability (Asset) as a Percentage of				
Covered Payroll	22.61%	51.03%	32.24%	(0.98%)

This schedule is intended to present 10 years of data. Additional years will be presented when available.

See accompanying independent auditors' report.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Schedules of Changes in the Employer's Net OPEB Liability and Related Ratios – Last Ten Years

Required Supplementary Information– GASB No. 75

(Unaudited)

(Dollars in Thousands)

	<u>2018</u>
Total OPEB Liability	
Total OPEB Liability - Beginning	\$ 154,254
Service Cost	2,820
Interest	10,821
Change of Benefit Terms	-
Differences between expected and actual experience	(11,860)
Change of assumptions	-
Benefit Payments	<u>(5,057)</u>
Net Change in total OPEB liability	(3,276)
Total OPEB Liability - Ending	<u>150,978</u>
Plan Fiduciary Net Position	
Plan fiduciary net position - beginning	<u>22,782</u>
Contributions - employer (claims + additional funding)	10,093
Contributions - employee	-
Net Investment Income	1,956
Benefit Payments	<u>(5,057)</u>
Net Change in plan fiduciary net position	6,992
Plan fiduciary net position - ending	<u>29,774</u>
Net OPEB Liability	<u>\$ 121,204</u>
Plan fiduciary net position as a percentage of the total OPEB liability	19.7%
Covered payroll	\$ 94,816
MWRA's net OPEB liability as a percentage of covered payroll	127.8%

Data is being accumulated annually to present 10 years of the reported information.

See accompanying independent auditors' report

MASSACHUSETTS WATER RESOURCES AUTHORITY

Schedules of Employer Contributions – Last Ten Years

Required Supplementary Information– GASB No. 75

(Unaudited)

(Dollars in Thousands)

	Fiscal year ended June 30,									
	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Actuarially determined contribution	\$ 11,400	\$ 10,948	\$ 14,996	\$ 14,564	\$ 15,621	\$ 14,482	\$ 19,151	\$ 17,433	\$ 18,896	\$ 17,554
Contributions in relation to the actuarially determined contribution	10,093	9,723	9,804	14,852	3,493	2,813	3,986	3,293	2,151	1,806
Contribution deficiency (excess)	\$ 1,307	\$ 1,225	\$ 5,192	\$ (288)	\$ 12,128	\$ 11,669	\$ 15,165	\$ 14,140	\$ 16,745	\$ 15,748
Covered Payroll	\$ 94,816	\$ 86,475								
Contributions as a Percentage of Covered Payroll	127.8%	152.7%								

Notes to Schedule

Methods and assumptions used to determine contributions rates:

Actuarial cost method	Entry Age Normal
Amortization method	30 years (closed)
Asset valuation method	Market value of assets
Inflation	3%
Healthcare cost trend rates	8% for 2018, decreasing 0.5% per year to an ultimate rate of 5%
Discount rate	7%
Mortality	<i>Actives:</i> RP-2014 Blue Collar mortality table for employees projected using generational mortality and scale MP-2017 <i>Retirees:</i> RP-2014 Blue Collar mortality tables for healthy annuitants projected using generational mortality and scale MP-2017 <i>Disabled:</i> RP-2014 Blue Collar mortality tables for healthy annuitants projected using generational mortality and scale MP-2017. Set forward one year.

See accompanying independent auditors' report

MASSACHUSETTS WATER RESOURCES AUTHORITY

Schedule of Funding Progress

Required Supplementary Information– GASB No. 45

June 30, 2017

(Unaudited)

(Dollars in Thousands)

Other Postemployment Benefits						
Actuarial Valuation	Assets (a)	Actuarial Accrued Liability (AAL) – (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll ((b-a)/(c))
January 1, 2016	\$ 10,827	\$ 131,430	\$ 120,603	8.2%	\$ 96,118	125.5%
January 1, 2014	-	167,744	167,744	-	85,993	195.1
January 1, 2012*	-	179,595	179,595	-	82,679	217.2
January 1, 2010	-	192,096	192,096	-	81,372	236.1
January 1, 2008	-	180,833	180,833	-	79,298	228.0

See accompanying independent auditors' report

*Actuarial accrued liability and unfunded actuarial accrued liability is from revised January 1, 2012 actuarial valuation.

MASSACHUSETTS WATER RESOURCES AUTHORITY
Accounts Established by the General Revenue Bond Resolution

June 30, 2018
(comparative totals for June 30, 2017)

(Dollars in thousands)

	<u>Construction</u>	<u>Debt Service</u>	<u>Operating</u>	<u>Rate Stabilization</u>	<u>Revenue</u>	<u>Combined Reserves</u>	<u>Total</u>
Balance – June 30, 2017	\$ 117,813	\$ 449,972	\$ 39,249	\$ 36,512	\$ 33,372	\$ 22,042	\$ 698,960
Proceeds from:							
Revenue Bonds and Loans	120,841	30,763	-	-	-	-	151,604
Cash Received from Customers	-	-	-	-	738,156	-	738,156
Interest Income	1,172	179	-	-	17,677	(16,251)	2,777
Debt Service Grant	-	-	-	-	-	-	-
Grant Receipts	452	4,216	-	-	47	-	4,715
Construction Payments	(147,981)	-	-	-	-	-	(147,981)
Capital Lease Payments	(1,041)	(2,175)	-	-	-	-	(3,216)
Debt Service Payment	(994)	(423,972)	-	-	(40,002)	-	(464,968)
Other Commonwealth Payments	-	-	-	-	(24,326)	-	(24,326)
Interfund Transfers	15,172	415,659	821	6,532	(453,551)	15,367	-
Transfers from (to) Operating Account	368	3,056	-	-	(241,421)	(411)	(238,408)
Balance – June 30, 2018	<u>\$ 105,802</u>	<u>\$ 477,698</u>	<u>\$ 40,070</u>	<u>\$ 43,044</u>	<u>\$ 29,952</u>	<u>\$ 20,747</u>	<u>\$ 717,313</u>

	<u>Sewer</u>	<u>Water</u>	<u>Total</u>	
			<u>2018</u>	<u>2017</u>
Restricted Investments:				
Construction	\$ 66,596	\$ 39,206	\$ 105,802	\$ 117,813
Debt Service - Debt Service Reserves	90,584	59,349	149,933	150,250
Debt Service - Debt Service P & I	205,784	96,906	302,690	273,811
Debt Service - Revenue Redemption	5,591	19,484	25,075	25,911
Operating Reserve	26,730	13,340	40,070	39,249
Rate Stabilization Reserve	28,439	14,605	43,044	36,512
Revenue	22,348	7,604	29,952	33,372
Combined - Renewal and Replacement Reserv	5,722	1,025	6,747	8,042
Combined - Insurance Reserve	7,000	7,000	14,000	14,000
Total Restricted Investments	<u>\$ 458,794</u>	<u>\$ 258,519</u>	<u>\$ 717,313</u>	<u>\$ 698,960</u>

See accompanying independent auditors' report.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Combining Statement of Net Position

June 30, 2018

(Dollars in thousands)

Assets	Sewer	Water	Combined Total
Unrestricted current assets:			
Cash and cash equivalents	\$ 35,778	\$ 16,836	\$ 52,614
Investments	1,687	9,565	11,252
Intergovernmental loans	6,641	24,613	31,254
Accounts receivable	130	713	843
Total unrestricted current assets	<u>44,236</u>	<u>51,727</u>	<u>95,963</u>
Restricted assets:			
Investments	463,896	260,532	724,428
Interest receivable	1,480	251	1,731
Grant receivable	856	89	945
Total restricted assets	<u>466,232</u>	<u>260,872</u>	<u>727,104</u>
Capital assets:			
Capital assets – not being depreciated	82,632	127,771	210,403
Capital assets – being depreciated – net	3,469,413	2,268,534	5,737,947
Total capital assets	<u>3,552,045</u>	<u>2,396,305</u>	<u>5,948,350</u>
Regulatory assets	431,941	73,974	505,915
Other assets, net	50,624	159,839	210,463
Total assets	<u>4,545,078</u>	<u>2,942,717</u>	<u>7,487,795</u>
Deferred Outflows of Resources			
Deferred outflows from pension	11,497	5,657	17,154
Deferred outflows from derivative instruments	18,963	2,025	20,988
Deferred outflows from refunding debt	26,872	20,725	47,597
Liabilities			
Current liabilities:			
Accounts payable and accrued expenses	46,917	2,548	49,465
Commercial paper notes	21,000	54,000	75,000
Current portion of long-term debt	158,644	67,273	225,917
Total current liabilities	<u>226,561</u>	<u>123,821</u>	<u>350,382</u>
Payable from restricted assets:			
Accounts payable for construction	15,214	4,442	19,656
Accrued interest on bonds payable	51,467	28,524	79,991
Reserves	35,722	22,352	58,074
Total payable from restricted assets	<u>102,403</u>	<u>55,318</u>	<u>157,721</u>
Retainage on construction in progress	3,759	5,808	9,567
Long-term debt – less current portion	3,269,376	1,922,940	5,192,316
Long-term capital lease	18,965	8,254	27,219
Net pension liability	13,229	7,796	21,025
Other postemployment benefits	78,062	43,142	121,204
Liability for derivative instruments	18,963	2,025	20,988
Total liabilities	<u>3,731,318</u>	<u>2,169,104</u>	<u>5,900,422</u>
Deferred Inflows of Resources			
Deferred inflows from pension	9,691	5,272	14,963
Deferred inflows from OPEB	6,461	3,571	10,032
Deferred inflows from regulated activities	19,606	23,112	42,718
Net Position			
Net investment in capital assets	275,012	484,745	759,757
Restricted	268,740	89,027	357,767
Unrestricted	291,583	196,292	487,875
Total net position	<u>\$ 835,335</u>	<u>\$ 770,064</u>	<u>\$ 1,605,399</u>

Commitments and contingencies

See accompanying independent auditors' report

MASSACHUSETTS WATER RESOURCES AUTHORITY

Combining Statement of Net Position

June 30, 2017

(Dollars in thousands)

Assets	Sewer	Water	Combined Total
Unrestricted current assets:			
Cash and cash equivalents	\$ 34,020	\$ 16,246	\$ 50,266
Investments	1,749	9,857	11,606
Intergovernmental loans	8,451	22,128	30,579
Accounts receivable	95	664	759
Total unrestricted current assets	<u>44,315</u>	<u>48,895</u>	<u>93,210</u>
Restricted assets:			
Investments	440,554	265,039	705,593
Interest receivable	1,269	393	1,662
Total restricted assets	<u>441,823</u>	<u>265,432</u>	<u>707,255</u>
Capital assets:			
Capital assets – not being depreciated	72,557	84,739	157,296
Capital assets – being depreciated – net	3,567,535	2,298,583	5,866,118
Total capital assets	<u>3,640,092</u>	<u>2,383,322</u>	<u>6,023,414</u>
Regulatory assets	509,194	113,234	622,428
Other assets, net	47,452	154,262	201,714
Total assets	<u>4,682,876</u>	<u>2,965,145</u>	<u>7,648,021</u>
Deferred Outflows of Resources			
Deferred outflows from pension	31,306	16,604	47,910
Deferred outflows from derivative instruments	32,420	3,335	35,755
Deferred outflows from refunding debt	38,815	29,529	68,344
Liabilities			
Current liabilities:			
Accounts payable and accrued expenses	55,170	1,130	56,300
Commercial paper notes	19,500	79,500	99,000
Current portion of long-term debt	147,653	46,186	193,839
Total current liabilities	<u>222,323</u>	<u>126,816</u>	<u>349,139</u>
Payable from restricted assets:			
Accounts payable for construction	13,849	4,998	18,847
Accrued interest on bonds payable	52,199	26,298	78,497
Reserves	35,164	22,089	57,253
Total payable from restricted assets	<u>101,212</u>	<u>53,385</u>	<u>154,597</u>
Retainage on construction in progress	3,477	3,621	7,098
Long-term debt – less current portion	3,405,690	1,931,929	5,337,619
Long-term capital lease	19,591	8,670	28,261
Net pension liability	29,187	16,617	45,804
Other postemployment benefits	78,008	32,367	110,375
Liability for derivative instruments	32,420	3,335	35,755
Total liabilities	<u>3,891,908</u>	<u>2,176,740</u>	<u>6,068,648</u>
Deferred Inflows of Resources			
Deferred inflows from pension	7,660	4,150	11,810
Deferred inflows from regulated activities	19,573	33,702	53,275
Net Position			
Net investment in capital assets	248,895	481,008	729,903
Restricted	253,147	85,926	339,073
Unrestricted	364,234	233,087	597,321
Total net position	<u>\$ 866,276</u>	<u>\$ 800,021</u>	<u>\$ 1,666,297</u>

Commitments and contingencies

See accompanying independent auditors' report

MASSACHUSETTS WATER RESOURCES AUTHORITY

Combining Statement of Revenues, Expenses, and Changes in Net Position

Year Ended June 30, 2018

(Dollars in thousands)

	<u>Sewer</u>	<u>Water</u>	<u>Combined Total</u>
Operating revenues :			
Customer services	\$ 477,379	\$ 250,902	\$ 728,281
Other	7,989	2,034	10,023
	<hr/>	<hr/>	<hr/>
Total operating revenues	485,368	252,936	738,304
	<hr/>	<hr/>	<hr/>
Operating Expenses:			
Operations	62,402	44,541	106,943
Maintenance	20,007	9,060	29,067
Payments in lieu of taxes	-	8,220	8,220
Engineering, general, and administrative	82,250	51,377	133,627
	<hr/>	<hr/>	<hr/>
Total operating expenses	164,659	113,198	277,857
	<hr/>	<hr/>	<hr/>
Income from operating before depreciation	320,709	139,738	460,447
	<hr/>	<hr/>	<hr/>
Depreciation and amortization	144,454	58,345	202,799
	<hr/>	<hr/>	<hr/>
Operating Income	176,255	81,393	257,648
	<hr/>	<hr/>	<hr/>
Regulatory accounting provisions:			
Change in reserves	(557)	(264)	(821)
Change in regulatory provisions, net	(77,286)	(28,670)	(105,956)
	<hr/>	<hr/>	<hr/>
Total regulatory accounting provisions	(77,843)	(28,934)	(106,777)
	<hr/>	<hr/>	<hr/>
Nonoperating revenues (expenses):			
Debt service grant	856	89	945
Investment income	2,911	1,084	3,995
Interest expense	(131,526)	(71,741)	(203,267)
Changes in derivative related accounts	2,528	412	2,940
	<hr/>	<hr/>	<hr/>
Total nonoperating expenses	(125,231)	(70,156)	(195,387)
	<hr/>	<hr/>	<hr/>
Net loss before capital grants and contributions	(26,819)	(17,697)	(44,516)
	<hr/>	<hr/>	<hr/>
Capital grants and contributions	2,545	2,170	4,715
	<hr/>	<hr/>	<hr/>
Decrease in net position	(24,274)	(15,527)	(39,801)
	<hr/>	<hr/>	<hr/>
Total net position - beginning of year	866,276	800,021	1,666,297
	<hr/>	<hr/>	<hr/>
Restatement to comply with GASB Statement No. 75	(6,667)	(14,430)	(21,097)
	<hr/>	<hr/>	<hr/>
Total net position - end of year	\$ 835,335	\$ 770,064	\$ 1,605,399
	<hr/>	<hr/>	<hr/>

See accompanying independent auditors' report

MASSACHUSETTS WATER RESOURCES AUTHORITY

Combining Statement of Revenues, Expenses, and Changes in Net Position

Year Ended June 30, 2017

(Dollars in thousands)

	<u>Sewer</u>	<u>Water</u>	<u>Combined Total</u>
Operating revenues :			
Customer services	\$ 463,210	\$ 242,723	\$ 705,933
Other	4,770	6,073	10,843
Total operating revenues	<u>467,980</u>	<u>248,796</u>	<u>716,776</u>
Operating Expenses:			
Operations	63,010	43,834	106,844
Maintenance	20,909	9,890	30,799
Payments in lieu of taxes	-	8,191	8,191
Engineering, general, and administrative	86,512	53,923	140,435
Total operating expenses	<u>170,431</u>	<u>115,838</u>	<u>286,269</u>
Income from operating before depreciation	297,549	132,958	430,507
Depreciation and amortization	<u>144,077</u>	<u>57,404</u>	<u>201,481</u>
Operating Income	<u>153,472</u>	<u>75,554</u>	<u>229,026</u>
Regulatory accounting provisions:			
Change in reserves	502	(334)	168
Change in regulatory provisions, net	<u>(48,980)</u>	<u>(13,902)</u>	<u>(62,882)</u>
Total regulatory accounting provisions	<u>(48,478)</u>	<u>(14,236)</u>	<u>(62,714)</u>
Nonoperating revenues (expenses):			
Debt service grant	363	28	391
Investment income	2,998	126	3,124
Interest expense	(138,308)	(79,495)	(217,803)
Changes in derivative related accounts	2,528	412	2,940
Total nonoperating expenses	<u>(132,419)</u>	<u>(78,929)</u>	<u>(211,348)</u>
Net loss before capital grants and contributions	(27,425)	(17,611)	(45,036)
Capital grants and contributions	<u>2,737</u>	<u>4,487</u>	<u>7,224</u>
Decrease in net position	(24,688)	(13,124)	(37,812)
Total net position - beginning of year	<u>890,964</u>	<u>813,145</u>	<u>1,704,109</u>
Total net position - end of year	<u>\$ 866,276</u>	<u>\$ 800,021</u>	<u>\$ 1,666,297</u>

See accompanying independent auditors' report

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APRIL 2019 REPORT OF THE CONSULTING ENGINEER

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Appendix B

April 23, 2019

Board of Directors
Massachusetts Water Resources Authority
Charlestown Navy Yard
100 First Avenue
Boston, MA 02129

Subject: Financial Feasibility Report General Revenue Bonds, 2019 Series B and General Revenue Refunding Bonds, 2019 Series C (Green Bonds), (collectively the “Bonds”)

Dear Members of the Board:

We are submitting herewith a Supplemental Report prepared to support the Massachusetts Water Resources Authority (the “MWRA” or the “Authority”) with its issuance of the Bonds. This report incorporates by reference the Triennial Report prepared by CDM Smith in October 2017 (the “2017 Triennial Report”), which assessed the condition and operations of the Authority. Terms used in this report that are not defined herein have the same definitions as used in the 2017 Triennial Report and/or the Official Statement for the Bonds.

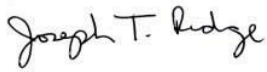
The financial projections contained herein are based on the Authority’s Proposed FY 2020 CEB (the “Proposed CEB”) and the Proposed FY 2020 CIP (the “Proposed CIP”). Historically, the Authority’s approved budget in any fiscal year is lower than the proposed budget, therefore CDM Smith believes it is a conservative and reasonable approach to base the projections in this report on the Proposed CEB and Proposed CIP.

The Proposed CEB incorporates changes that occurred during FY 2019. These updates are included in the projections, and include:

- A \$13.9 million defeasance of outstanding principal in FY 2019 that will positively impact FY 2020 and subsequent years.
- A \$15.0 million defeasance of outstanding principal planned in FY 2019 that will positively impact FY 2020 and subsequent years, funded through \$7.1 million budgeted for debt prepayment and \$7.9 million from the FY 2018 surplus.
- A \$4.9 million debt prepayment in FY 2020 with savings realized beginning in FY 2021.
- Updated projections reflecting the resolution of the HEEC cross-harbor cable litigation.
- Updated projections reflecting timing and increased deposits to pension fund contributions based on actuarial adjustments.

The balance of this Supplemental Report provides an evaluation of the Authority's financial status and projections. We stand ready to respond to any questions regarding the content of our work.

Very truly yours,
CDM Smith Inc.

A handwritten signature in black ink that reads "Joseph T. Ridge". The signature is written in a cursive style with a clear, legible font.

Joseph T. Ridge
Vice President

Financial Requirements

1 Introduction

Our financial evaluation and projections are based on a review of the Authority's audited financial statements and various budget documents, current, proposed, and historical, as well as the Authority's financial projections. Our analysis is based on the following documents and data sources: the Authority's actual operating results through FY 2018, the FY 2019 Current Expense Budget (the "CEB"), the FY 2019 Capital Improvement Program (the "CIP"), the Proposed FY 2020 CEB (the "Proposed CEB"), the Proposed FY 2020 CIP (the "Proposed CIP"), the most recent Master Plan, and the Authority's projections of grant receipts, escrows, and participation in the Massachusetts Clean Water Trust SRF loan program (the "SRF"). The values for FY 2019 are based on the CEB, while the projections for FY 2020 and future years rely on the Proposed CEB as the base; historically the approved budget for any fiscal year has been less than the proposed. We believe that this is a conservative and reasonable approach to developing the projections contained herein.

We have reviewed the Authority's projected revenue requirements for a five-year forecast period, taking into account present expenditures, anticipated schedules for capital improvements, the Authority's FY 2019 CIP and CEB, interim financial results for FY 2019, the Authority's FY 2020 Proposed CIP and CEB, and the covenants of the Resolution.

The purposes of this section are to:

- Project Authority expenses for FY 2020 through FY 2024.
- Project non-rate revenues for the same period.
- Project rate increases for FY 2020 through FY 2024.
- Assess the impacts of such rate increases on customers.
- Evaluate the Authority's compliance with various Resolution covenants.

The projections contained in this Report reflect assumptions regarding the schedule, timing and cost of certain key capital projects as set forth in the CIP and the Proposed CIP. Modifications to the timing and costs of those projects will impact the projections and potentially the conclusions contained herein.

2 Key Assumptions

This section describes the key assumptions that have been used by the Authority in developing its own projections which are the basis of the projections contained herein. CDM Smith has reviewed the Authority's assumptions and believes that they are reasonable for developing these financial projections. These projections consider the data and information described above, assumptions regarding economic conditions, Authority policies and spending practices, and the Authority's most recent financings. These projections consider Authority-developed projections on the use of debt defeasances and tax-exempt commercial paper ("TECP"). The projections are developed such that the Authority's projected revenues and expenses meet the various requirements of the Resolution.

As described in subsequent subsections, the Resolution requires the Authority to comply with two rate covenants regarding the adequacy of rate revenue. The covenants require that the Authority generate sufficient revenue to meet all annual revenue requirements including operation and maintenance expenses, pro rata debt service fund deposits, and reserve fund requirements; and provide revenue available for debt service payments in each fiscal year equal to the sum of the Primary and Secured Bond Coverage Ratios. The key assumptions and inputs used for these projections include:

- Future senior debt for FY 2020 is assumed to be 25-year debt, with an interest rate of 5.25 percent. After FY 2020, future senior debt is assumed to be 30-year debt, with an interest rate of 5.50 percent for FY 2021, 5.75 percent for FY 2022, and 6.0 percent for subsequent fiscal years. Variable-rate debt is assumed to carry an interest rate of 3.75 percent in FY 2020, 4.0 percent in FY 2021, and 4.22 percent thereafter.
- SRF loans will carry an effective interest rate of 2.15 percent with a 20-year term for FY 2020 and all subsequent fiscal years.
- Capital costs are projected to inflate at an average annual rate of 2.5 percent for projects not yet under contract. It should be noted that changes to this assumption will not have a significant impact on the Authority's projected increases in total expenses over the forecast period but will have a greater impact over the longer term.
- Labor costs are projected to inflate at an average annual rate of 2.7 percent for all future years. Other operating and maintenance costs for existing facilities are projected to inflate at an average annual rate of 3.0 percent for all future years. Projects scheduled to come on line from FY 2020 to FY 2024 are projected to have a modest impact on the Authority's total operating expenses.
- Capital spending is based on the Proposed CIP, and it is assumed that the Authority's expenditure rate will average 85 percent of the budgeted cash expenditure rate. However, two-thirds of the deferred expenditures are expected to be spent three years later. Thus, the amount deferred in FY 2020 is added to FY 2023 anticipated CIP expenditures.
- The Authority received \$994,726 in debt service assistance (DSA) from the Commonwealth for FY 2018 that will be used to offset FY 2019 capital financing costs. The Authority's projections assume that no additional Commonwealth DSA will be received during the projection period. However, the Authority may receive additional DSA for FY 2019, which if received will be applied to offset FY 2020 capital financing costs.
- The Authority deposited \$6.5 million into the Rate Stabilization Fund as a reserve for the HEEC capacity charge included in the tariff. These projections assume that the Authority utilizes these funds in FY 2021 through FY 2025 to offset the anticipated increased costs related to the harbor cable capacity charge. The projection assumes no additional withdrawals from the Rate Stabilization Fund during the projection period.
- The Authority anticipates a defeasance of \$15.0 million in outstanding principal at the end of FY 2019 that impacts FY 2020 and subsequent debt service requirements.

3 Rate Revenue Requirements

In describing the projected rate revenue requirements as shown in Tables 1 through 3, we have followed the Authority's CEB format with expenditures classified as direct, indirect and capital financing. Non-rate revenue is then applied against total expenses to determine the Authority's rate revenue requirement for a fiscal year.

3.1 Direct Expenses

Projected direct expenses are summarized in Table 1 and discussed in the following sections. Direct expenditures are projected to increase from approximately \$239.6 million in FY 2019 to approximately \$278.8 million in FY 2024, an average annual increase of 3.1 percent. These projections reflect the costs of operating and maintaining the Systems, as well as the net incremental costs associated with new facilities and projects that the Authority anticipates becoming operational during this time.

The Authority reached an agreement with NSTAR to install a replacement cross-harbor cable that will resolve the issues of location and depth of the existing cable. The replacement cable is currently estimated to cost approximately \$115 million with the Authority granted a \$17.5 million credit related to the early retirement of the existing cable. The Authority anticipates increased payments beginning in FY 2020, with the expectation of paying 50 percent of the costs not later than the time the project is placed in service, and the balance paid by the Authority over time through the tariff for electricity supplied through the cable. In anticipation of the increased costs, the Authority deposited \$6.5 million in FY 2018 to the Rate Stabilization Fund, which is projected to be used to offset the increased costs between FY 2021 and FY 2025. CDM Smith does not believe the short-term increases will be beyond the abilities of the Local Bodies and their retail customers' ability to pay. (See the Official Statement, of which this Appendix B is a part, under Environmental Regulation and Litigation – Wastewater Management – Cross-Harbor Power Cable).

The increase in direct expenses largely reflects the anticipated inflationary increases in labor and other operating costs. The Authority has also been actively pursuing various cost saving measures including, but not limited to, lease space reductions, staff cross-training, negotiating competitive agreements for energy and chemicals, and increasing energy self-generation to further control costs over the short- and long-term. The Authority has experienced an increase in chemical costs above historical assumptions, as it renews multi-year supply contracts and changes in use of certain chemicals. The Authority anticipates revisions to its NPDES permit in the future and based on the permit requirements for similar wastewater facilities, anticipates the need to provide treatment to remove enterococcus which is estimated to require a \$1 million increase in chemical costs. However, the projections do not include funding in FY 2020 for potential increased costs from a revised permit, since the Authority does not anticipate that a new permit will be issued and take effect in FY 2020. CDM Smith does not believe that the issuance of a new permit and the associated costs that would be incurred over the forecast period will have a material impact on the projections.

Sewer Fund direct expenses, as presented in Table 1, includes allocated administrative expenses but excludes the Clinton Wastewater Treatment Plant expenses. (The Clinton Wastewater Treatment Plant is treated as a Waterworks Fund expense because the facility was constructed to mitigate the impact of certain Waterworks System facilities). Sewer Fund direct expenses are projected to increase at an average annual rate of approximately 2.9 percent from FY 2019 to FY 2024, reflecting primarily the impact of assumed inflation increases for operating existing facilities. Net incremental costs on Sewer Fund direct expenses from capital improvements are projected through FY 2024.

Administrative and support expenses are allocated between the Waterworks Fund and the Sewer Fund, based on the total direct annual costs in each Fund. Approximately 62 percent of allocable direct administrative expenses were assigned to the Sewer Fund for FY 2019 and throughout the forecast period.

The Waterworks Fund direct expenses are projected to increase at an average annual rate of 3.4 percent between FY 2019 and FY 2024. The Waterworks Fund expenses include Clinton Wastewater Treatment Plant costs.

Table 1
Budgeted and Projected Direct Expenses, By Fund, FY 2019-2024
(\$ in 000's)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Sewer Fund Direct Expenses ¹	\$158,495	\$164,145	\$168,823	\$173,204	\$178,123	\$183,127
Waterworks Fund Direct Expenses ²	<u>\$81,117</u>	<u>\$84,607</u>	<u>\$88,021</u>	<u>\$90,487</u>	<u>\$93,035</u>	<u>\$95,652</u>
Total Direct Expenses	\$239,612	\$248,751	\$256,843	\$263,691	\$271,157	\$278,779

¹ Includes Sewer Division, sewer portions of the Field Operating Division and allocated Engineering and Construction, Laboratory Service and Administrative. Excludes Clinton Wastewater Treatment Plant.

² Includes Waterworks Division, water portions of Field Operating Division, the Clinton Wastewater Treatment Plant and allocated Engineering and Construction, Laboratory Services and Administrative.

Note: Totals may not add exactly due to rounding.

Table 2 presents a breakdown of the Authority's projected combined direct expenses, by expense category. These expenses are presented by CEB line item for the period FY 2019 through FY 2024. Excluding capital financing expenses, labor costs are the Authority's largest line item expense representing 56.2 percent of total direct expenses over the projection period and are projected to increase from \$135.1 million in FY 2019 to \$156.3 million in FY 2024. Labor costs are expected to increase at an average annual increase of 3.0 percent over the period between FY 2019 and FY 2024, representing the impact of inflation and additional labor costs related to the incremental O&M from capital projects during the projection period.

Table 2
Budgeted and Projected Direct Expenses, by Category, FY 2019-2024
(\$ in 000's)

Category	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Labor	\$135,076	\$139,739	\$144,282	\$148,178	\$152,179	\$156,287
Chemicals	\$10,830	\$12,088	\$12,450	\$12,824	\$13,208	\$13,605
Utilities	\$22,869	\$24,199	\$24,894	\$25,641	\$26,410	\$27,146
Maintenance & Materials	\$39,640	\$39,971	\$41,222	\$42,034	\$43,295	\$44,594
<u>Services</u>	<u>\$31,197</u>	<u>\$32,754</u>	<u>\$33,994</u>	<u>\$35,014</u>	<u>\$36,065</u>	<u>\$37,147</u>
Total Direct Expenses	\$239,612	\$248,751	\$256,843	\$263,691	\$271,157	\$278,779

Note: Totals may not add exactly due to rounding.

Chemical costs account for approximately 4.8 percent of direct expenses and are estimated to increase at an average annual rate of 4.7 percent between FY 2019 and FY 2024, in part reflecting assumed inflation for future costs. The Authority is in discussions with the regulatory agencies regarding a new NPDES permit for the Deer Island Treatment Plant (the "DITP"); however, as of the submittal of the Proposed CEB, the Authority has not been given an indication of the timing for the issuance of the new NPDES permit, nor any insights into what substantive changes, if any, may be included in the permit.

Utilities, which represent approximately 9.7 percent of direct expenses, are expected to increase at an average annual rate of 3.5 percent between FY 2019 and FY 2024, reflecting the Authority's fixed price energy agreements, as well as most recent pricing outlook and trends in fuel and electricity market prices and planned usage. Maintenance and materials, which represent 16.1 percent of direct expenses over the projection period, are projected to increase at an average annual rate of 2.4 percent from FY 2019 to FY 2024. Services represent 13.2 of the direct expenses and are projected to increase at an average annual rate of 3.6 percent over the projection period.

3.2 Indirect Expenses

Indirect expenses for FY 2019 through FY 2024 are summarized in Table 3. Indirect expenses include a number of cost items that reflect financial commitments by the Authority, but which are not directly controlled by an operating division of the Authority. As an example, the Authority has agreed to compensate certain Local Bodies (Quincy and Winthrop) for the adverse impacts caused by the construction and operation of facilities located in those communities. These mitigation payments are financial obligations of the Authority and are allocated specifically to either the Waterworks System or the Sewer System.

Table 3
Budgeted and Projected Indirect Expenses, FY 2019-2024
(\$ in 000's)

Category	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Insurance	\$2,099	\$2,081	\$2,165	\$2,251	\$2,341	\$2,435
Watershed/PILOT	\$26,406	\$27,195	\$28,011	\$28,851	\$29,716	\$30,608
Cable Substation Lease	\$1,387	\$4,429	\$5,238	\$6,276	\$6,439	\$6,727
Mitigation	\$1,614	\$1,655	\$1,696	\$1,738	\$1,782	\$1,826
OPEB	\$5,574	\$5,962	\$6,065	\$6,149	\$6,210	\$6,249
Reserves Additions	\$1,882	\$2,087	\$1,559	\$1,393	\$1,354	\$1,404
Pension Fund Deposits	\$7,000	\$7,315	\$7,644	\$7,988	\$8,348	\$8,723
Total Indirect Expenses	\$45,963	\$50,724	\$52,377	\$54,647	\$56,190	\$57,973

Note: Totals may not add exactly due to rounding.

The major indirect expenses are:

Insurance: The Authority purchases property and casualty insurance from external insurance carriers and self-insures for significant levels of property and general liabilities.

Watershed/PILOT: The Enabling Act requires the Authority to pay the Commonwealth for two obligations. The first obligation is to reimburse the Commonwealth for the operating costs and debt service associated with land acquisitions of the DCR's Division of Water Supply Protection. The Authority prepaid the remaining debt service costs associated with the land

acquisition in FY 2016, from the operating surplus. The second obligation is to make payments in lieu of taxes ("PILOT") to each city or town with land located in the Authority's watersheds. PILOT payments are revalued every four years, the most recent occurring in FY 2018. The Authority's projections assume that PILOT payments will increase 3.0 percent annually from FY 2020 through FY 2024. CDM Smith believes the Authority's approach is appropriately conservative for these purposes.

Cable and Substation Lease: NSTAR Electric Company (successor to Boston Edison Co. and now doing business as Eversource) together with Harbor Electric Energy Company ("HEEC"), an NSTAR subsidiary, completed installation of a cross-harbor power cable and built a power substation in 1990-1991 to supply electric power for the construction and operation of the DITP. The Authority paid HEEC's capital investment for the cross-harbor electrical cable over a 25-year schedule governed by a written agreement, with contractual obligations ending in FY 2015. At the end of the term of that agreement, HEEC petitioned the Massachusetts Department of Public Utilities to establish a tariff formalizing the terms for continued supply of power to the DITP. The Authority fully participated in that 2015 tariff proceeding and is engaged with HEEC in a rate setting process to update that tariff and to incorporate the terms of a May 2017 agreement whereby HEEC will install and MWRA will pay for a replacement power cable. The existing cable will be de-commissioned in order to allow for planned harbor dredging, and the creation of deep draft ship berths within the Reserved Channel where the existing cable enters Boston Harbor. The replacement cable is anticipated to be placed in service in December 2019, with additional costs related to the replacement cable projected to start in FY 2020. The Authority allocated \$6.5 million in FY 2018 for a HEEC cable capacity reserve fund, deposited to the Rate Stabilization Fund and intended to be utilized between FY 2021 and FY 2025 to partially mitigate the rate impact of the increased costs related to the capacity charges included in the tariff for the replacement cable. The Authority has paid approximately \$30 million to date towards its total share of the cost for the replacement cable.

Mitigation: The Authority is party to an agreement that requires the Authority to make payments to the Town of Winthrop to ameliorate the adverse physical, social, and economic impacts of the DITP. The mitigation payment is estimated to be \$807,131 in FY 2019. The Authority also has a mitigation agreement with the City of Quincy that requires the Authority to make payments for police, fire, and other municipal services for several Authority water and sewer facilities located in Quincy, and the Authority budgeted \$807,131 for FY 2019. The projections assume both agreements remain in effect in substantially their current forms throughout the forecast period and includes an annual increase of not more than 2.5 percent.

Additions to Reserves: The Authority is required by the terms of the Resolution to maintain reserve funds for operations, insurance, and renewal and replacement. These reserves are incrementally funded each year, as necessary, to bring them to stipulated levels. These are discussed in more detail in the following section.

Pension Fund Contribution: The Authority's methodology for assessing retirement liability is to comply with Chapter 32 of the Massachusetts General Laws, although current policy is to reach full-funding by FY 2026. For FY 2019, the Authority anticipates contributing \$7.0 million to the Pension Fund, which is the required contribution based on the most recent actuarial evaluation completed June 2018. Based on the actuarial report, the Authority has funded 95.0 percent of its pension liability as of January 1, 2018.

Other Post-Employment Benefits: The Authority adopted GASB 45, which requires accounting and reporting of post-employment benefits other than pensions (“OPEB”). The Authority had elected to use funds that would otherwise be allocated to OPEB to prefund its unfunded pension liability reducing the 17-year funding schedule. In 2015, the Authority created the Massachusetts Water Resources Authority Irrevocable Other Post-Employment Benefits Trust (the “OPEB Trust”) to meet its OPEB liability. The Authority has deposited approximately \$25.9 million into the OPEB Trust. This includes \$10.0 million related to amounts released from reserves as a result of amendments to the General Bond Resolution that were effective in April 2015, \$800,000 in FY 2010 funds set aside for OPEB related expenses, a \$5.2 million deposit on June 30, 2016, a \$4.9 million deposit on June 30, 2017, and a \$5.0 million deposit in FY 2018. The Authority anticipates a deposit of \$5.6 million in FY 2019. Under the Authority’s current plan, the Authority anticipates depositing between \$6.0 and \$6.2 million in each year of the forecast period, but this may change based on the anticipated review of pension fund contributions. As of the end of FY 2018, the OPEB Trust had a balance of \$29.8 million. Beginning in FY 2018, GASB 75 is the prevailing guidance for OPEB contributions.

3.3 Reserve Funds

The Authority is required by the Resolution to meet funding requirements for certain funds. The Authority is required to maintain an Operating Reserve Fund to be used in the event of unexpected or extraordinary fluctuations in monthly operation and maintenance expenses. The Authority is required to have on deposit in the Operating Reserve Fund at the end of each fiscal year an amount equal to one-sixth of that fiscal year’s operating expenses. (Operating expenses are the total of direct and indirect expenses found in the Tables 2 and 3, less the amounts expended for Watershed/PILOT, Reserve additions, and OPEB Trust contributions).

At the end of FY 2018, the Operating Reserve had a balance of \$40.3 million. Accordingly, in the FY 2019 CEB, a required contribution of \$1.9 million is anticipated to maintain the required balance with additional contributions of \$2.1 million, \$1.6 million, \$1.4 million, \$1.4 million, and \$1.4 million are projected for FY 2020 through FY 2024, respectively.

The Resolution requires the Authority to fund an Insurance Reserve Fund to a level confirmed by a qualified insurance consultant. The Insurance Reserve Fund was last reviewed by the Insurance Consultant in February 2017 and the Consultant confirmed that a balance between \$12 million and \$16 million would be appropriate. The Authority maintains the Insurance Reserve Fund at the midpoint of that range at \$14 million. The Authority expects the fund balance to remain level at \$14 million throughout the forecast period. The Insurance Reserve Fund Requirement has not been independently reviewed or evaluated by CDM Smith.

The Resolution also requires the Authority to fund a Renewal and Replacement Reserve Fund, based on the recommendations of the Consulting Engineer. The Renewal and Replacement Reserve Fund is established to pay the costs of emergency repairs or capital improvements to the Systems when funds are not available in either the Construction Fund or the Operating Fund. Projects financed from the Renewal and Replacement Reserve Fund must be necessary to ensure the continual operation of the Systems, and not previously identified to be financed from the Operating Fund. The Renewal and Replacement Reserve Fund requirement is presently established at a total of \$35 million, as most recently determined in the 2017 Triennial Report. The Resolution, as amended, requires the Authority to maintain a minimum cash balance of \$10 million in the Renewal and Replacement

Reserve Fund. The remaining balance will be met through unused capacity in the TECP program. Based on the current funding requirement, no additional deposits are projected to be required over the forecast period.

The Authority has in the past and may in the future pre-fund required reserve fund deposits.

3.4 Capital Spending

The projected capital spending for FY 2019 through FY 2024 is presented in Table 4, based on the Proposed CIP. The capital expenditures presented in this table are presented on a cash basis and represent the anticipated actual expenditures for various projects. The projected capital expenditures are based on contracts that are currently underway, as well as projected future projects reflected in the Proposed CIP. Inflated estimates are based on a 2.5 percent average annual inflation rate for all projects that are not under contract until after the end of FY 2019. In our opinion, the assumed inflation rate is reasonable given anticipated inflation trends. This inflation rate should provide an adequate allowance for currently unforeseen factors that could increase inflation pressures on construction costs.

Contingency amounts shown in Table 4 are based on projected cash expenditures. The contingency in a particular year is estimated to be 7.0 percent of projected spending, except for tunnel related projects which carry a 15 percent contingency. We believe that the Authority's contingency assumptions are reasonable and appropriate and provide sufficient allowances to cover unanticipated events.

As part of the FY 2019 CIP, the Authority established a spending cap for FY 2019 to FY 2023 with a baseline cap totaling \$984.8 million and total baseline projected expenditures of \$1,052 million. The total baseline projected expenditures include spending for the local I/I loan and grant program and local water pipeline loan program, which are excluded from the cap. For the FY 2019 to FY 2023 period the Proposed CIP projects spending of \$984.6 million compares to the baseline of \$984.8 million, and the projected expenditures including the I/I program and water loan program of \$1,084 million compare to the baseline of \$1,052 million.

The Proposed CIP identifies water system redundancy, asset protection, support for community assistance programs, business system support, and pipeline replacement and rehabilitation as the primary focus of the Authority's capital spending going forward.

The Authority is advancing its project to construct long-term redundancy improvements for the Metropolitan Tunnels that supply water to the metropolitan Boston area. The Authority, based on a Board vote in February 2017, is moving forward with permitting and design for the redundancy project, which anticipates the construction of two deep rock tunnels to provide redundant potable water conveyance to the Authority's Boston metropolitan service area. The Authority has approved its initial contract for program support services for this project. The Proposed CIP includes \$1.4 billion for the long-term redundancy project which the Authority anticipates expending over a period of approximately 17 years. The Authority is establishing a dedicated group responsible for the implementation and oversight of the redundancy initiative and projects, similar to the approach taken in constructing the DITP. The Proposed CEB carries five additional employees to support this initiative in FY 2020 but may not fill all of those positions this coming Fiscal Year. The five positions being authorized in the Proposed CEB will bring staffing for this program to 10. The Authority anticipates 10 additional employees over the forecast period.

Table 4
Projected Capital Spending, Inflated and Uninflated, FY 2019-2024
(\$ in 000's)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Sewer System¹						
Contracted ²	\$65,140	\$87,176	\$75,927	\$74,596	\$47,306	\$20,483
Uncontracted ²	\$17,020	\$74,341	\$74,494	\$59,818	\$58,918	\$125,664
<u>Contingency²</u>	<u>\$6,695</u>	<u>\$12,317</u>	<u>\$11,607</u>	<u>\$10,553</u>	<u>\$8,646</u>	<u>\$11,563</u>
Subtotal²	\$88,855	\$173,834	\$162,028	\$144,966	\$114,870	\$157,710
Waterworks System¹						
Contracted ²	\$50,040	\$36,660	\$16,637	\$6,325	\$2,119	\$1,946
Uncontracted ²	\$25,016	\$28,203	\$69,936	\$64,595	\$58,962	\$132,038
<u>Contingency²</u>	<u>\$4,939</u>	<u>\$4,373</u>	<u>\$6,081</u>	<u>\$4,993</u>	<u>\$4,313</u>	<u>\$9,812</u>
Subtotal²	\$79,995	\$69,236	\$92,654	\$75,913	\$65,393	\$143,796
Total CIP - Uninflated ²	\$168,851	\$243,070	\$254,682	\$220,879	\$180,264	\$301,506
Total CIP - Inflated	\$168,851	\$245,813	\$262,504	\$231,112	\$193,355	\$337,796

¹ Includes allocated Administrative Division expenses.

² Stated in 2019 dollars throughout forecast period.

Table 5 presents the projected flow of funds within the Construction Fund from FY 2019 through FY 2024. Most construction funding is projected to be financed with long-term debt or SRF loans; however, the Authority intends to fund a total of \$100.2 million in capital expenditures through pay-as-you-go current year funding for the projection period. The assumption for future years is that SRF loan availability remains stable beyond FY 2019, but that no grant funding will be available.

Table 5
Construction Fund Projected Cash Flow, FY 2019-2024
(\$ in 000’s)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Construction Needs ¹	\$157,379	\$223,945	\$239,708	\$213,443	\$188,933	\$313,377
Financed by:						
Balance: Begin. of Year	\$98,808	\$161,666	\$104,616	\$31,624	\$30,073	\$43,418
Long Term Debt	\$110,656	\$109,695	\$108,517	\$152,692	\$142,078	\$258,651
SRF	\$50,000	\$42,000	\$42,000	\$42,000	\$42,000	\$42,000
Pay As You Go	\$14,200	\$15,200	\$16,200	\$17,200	\$18,200	\$19,200
Balance: End of Year²	\$116,286	\$104,616	\$31,624	\$30,073	\$43,418	\$49,892

¹ Construction needs is approximately 85 percent of “Total CIP – Inflated” line shown on bottom of Table 4, plus two-thirds of the 15 percent deferred three years earlier.

² The Balance: End of Year is equal to the sum of the available sources, less projected construction needs.

Note: Totals may not add exactly due to rounding.

The Authority has developed its projections of borrowing amounts in a fiscal year, such that it begins the following fiscal year with a Construction Fund starting balance that, when combined with SRF loans, grants, and pay-as-you-go capital, is at least 10 percent of the next fiscal year’s construction requirement. This, coupled with the availability of TECP, provides a sufficient cushion to prevent disruption of the Authority’s capital program from unanticipated or unfavorable capital market conditions.

The capital spending program described in the preceding paragraphs affects the Authority’s revenue requirement in two ways:

- Debt service must be paid on the bonds issued to fund the program.
- Sufficient revenues must be generated to comply with the Primary and Secured Coverage requirements.

Table 6 presents existing and projected debt service resulting from the projected capital spending program. Annual debt service in a fiscal year is based on the monthly debt service deposits that are required in accordance with the Resolution. As noted earlier, no Commonwealth debt service assistance is assumed for the projection period beyond FY 2019.

Table 6
Current and Projected Debt Service, FY 2019-2024
(\$ in 000's)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Senior Debt						
Principal to be Issued in FY ¹	\$125,000	\$125,000	\$123,167	\$172,009	\$160,677	\$289,154
Existing Senior Debt Service	\$269,134	\$199,632	\$282,537	\$272,904	\$336,605	\$338,835
<u>Future Senior Debt Service</u>	<u>\$3,500</u>	<u>\$5,083</u>	<u>\$4,237</u>	<u>\$6,082</u>	<u>\$5,836</u>	<u>\$10,503</u>
Total Senior Debt Service	\$272,634	\$204,716	\$286,774	\$278,986	\$342,441	\$349,339
Debt Service Assistance	(\$540)	\$0	\$0	\$0	\$0	\$0
<u>Bond Redemption Account</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
Net Senior Debt Service	\$272,094	\$204,716	\$286,774	\$278,986	\$342,441	\$349,339
Subordinated/SRF Debt						
Principal to be Issued in FY ¹	\$50,000	\$42,000	\$42,000	\$42,000	\$42,000	\$42,000
Existing Debt Service	\$160,312	\$239,530	\$167,263	\$193,629	\$141,890	\$126,667
<u>Future Sub/SRF Debt Service</u>	<u>\$21,101</u>	<u>\$24,197</u>	<u>\$25,895</u>	<u>\$28,503</u>	<u>\$31,013</u>	<u>\$33,552</u>
Total Sub/SRF Debt Service	\$181,413	\$263,726	\$193,157	\$222,132	\$172,904	\$160,219
<u>Debt Service Assistance</u>	<u>(\$405)</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
Net Sub/SRF Debt Service	\$181,007	\$263,726	\$193,157	\$222,132	\$172,904	\$160,219
Total Debt Service	\$453,102	\$468,442	\$479,932	\$501,118	\$515,345	\$509,558

¹Total principal amount represents the amount of bonds required to provide the Construction Fund Deposit shown on line 1 of Table 5, plus repayment of TECP issued in prior fiscal year(s). This amount is increased to reflect Debt Service Reserve Fund Requirements and cost of issuance.

Note: Totals may not add exactly due to rounding.

Total Senior Debt Service is projected to increase from approximately \$272.6 million in FY 2019, to approximately \$349.3 million in FY 2024 before accounting for proceeds from the Bond Redemption Account, and DSA in FY 2019. In Table 6, Net Senior Debt Service reflects the senior debt service with the reduction of current and anticipated DSA and the Bond Redemption Account. The Bond Redemption Account is a valuable rate-smoothing tool available to the Authority, and the Authority estimates that it will have nearly \$26.1 million in the Bond Redemption Account at the beginning of the forecast period. The Authority does not expect to draw from the Bond Redemption Account during the projection period; however, the timing and amount of actual usage may vary.

Subordinated debt service, including both SRF and other outstanding subordinated Authority debt, is projected to increase to a peak of \$263.7 million in FY 2020, then decreases to \$160.2 million in FY 2024. No future variable-rate debt is assumed to be issued over the timeframe of these projections, an assumption that may change based on market conditions. Projected SRF debt service assumes an interest rate of 2.15 percent for FY 2019 and the remainder of the projection period.

3.5 Non-Rate Revenues

The Authority receives revenues from a variety of sources that offset the amount that must be collected from the Local Bodies. Total non-rate revenues are budgeted at \$28.9 million in FY 2019 and are projected to increase to a total of \$35.0 million in FY 2024. Table 7 summarizes these sources from FY 2019 through FY 2024.

Table 7
Projected Non-Rate Revenue, FY 2019-2024
(\$ in 000's)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Rate Stabilization Fund						
Withdrawal	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$15,342	\$14,870	\$15,192	\$15,521	\$15,435	\$15,693
<u>Investment Income</u>	<u>\$13,559</u>	<u>\$15,504</u>	<u>\$16,366</u>	<u>\$16,677</u>	<u>\$18,234</u>	<u>\$19,287</u>
Total Non-Rate Revenue	\$28,902	\$30,374	\$31,558	\$32,197	\$33,668	\$34,980

Note: Totals may not add exactly due to rounding.

Major non-rate revenue sources are briefly described in the following:

Rate Stabilization Fund Withdrawal: When annual revenues exceed expenses, the Authority may deposit the money in the Rate Stabilization Fund. In future years, money may be withdrawn from the Rate Stabilization Fund to reduce rate revenue requirements. The projections cap Rate Stabilization Fund withdrawals at an amount no greater than 10 percent of the Required Debt Service Fund Deposits, net of DSA credited to Senior Debt for such year, consistent with the Resolution, and use such amounts as available to moderate projected rate increases consistent with Authority practice. The Rate Stabilization Fund balance at the end of FY 2019 is projected to be approximately \$43.0 million. This total includes the \$6.5 million deposit in FY 2018 intended as a reserve for the HEEC capacity charge included in the tariff, which is anticipated to be used between FY 2021 and FY 2025 to partially mitigate the increased capacity charge as a result of the replacement cross-harbor cable. The Authority does not anticipate any additional withdrawals from the Rate Stabilization Fund for the projection period.

Investment Income: The Authority earns interest by investing fund balances in a variety of interest-bearing securities. Interest earnings from these funds, except for the Debt Service Reserve Fund, are transferred to the Revenue Fund and are available to meet the ongoing obligations of the Authority. Interest earned in the Debt Service Reserve Fund remains in that Fund to help meet its funding requirement. Total investment income is projected to increase from approximately \$13.6 million in FY 2019 to approximately \$19.3 million in FY 2024. The fluctuations in investment income between FY 2019 and FY 2024 partially reflect changes in the Construction Fund, Rate Stabilization Fund, and Debt Service Reserve Fund balances.

Miscellaneous: The Authority also receives certain amounts from Local Bodies, primarily the Chicopee Valley Aqueduct (“CVA”) communities that are provided water under various contracts, as well as payments from the Town of Clinton for partial operation of the Clinton Wastewater Treatment Plant. The Authority is projected to receive approximately \$31.8 million from the CVA communities under the contractual service agreements over the forecast

period. The Authority estimates that over the same period it will collect \$11.8 million in water revenue from sewer customers to offset water usage at the DITP. The Authority also receives a variety of fees, penalties and charges in its normal course of business.

4 Rate Revenue Requirement and Retail Customer Impacts

4.1 Rate Revenue Requirement

Table 8 summarizes the projected rates for FY 2019 through FY 2024, based on the Proposed CEB and other factors described herein. For FY 2019, the Authority’s rate revenue requirement increased by approximately 3.1 percent over FY 2018 levels to a total of approximately \$739.0 million. The rate revenue requirement equals the total amount of expenses in a fiscal year (including required reserve deposits and any amounts required to meet coverage requirements) less non-rate revenues. Of this amount, approximately \$489.2 million will be required to meet the expenses of the Sewer System, including allocated administrative and indirect expenses, and approximately \$249.9 million for the Waterworks System.

Rate revenues are projected to increase to approximately \$875.8 million in FY 2024, an average annual increase of 3.5 percent from FY 2019 levels. For the Sewer System, the rate revenue requirement is projected to increase from \$489.2 million to approximately \$575.8 million, an average annual increase of approximately 3.3 percent. The Waterworks System revenue requirement is projected to increase from \$249.9 million in FY 2019 to approximately \$300.0 million in FY 2024, an average annual increase of 3.7 percent.

The Authority historically has attempted to smooth total rate increases to mitigate significant short-term rate increases. Recognizing that smoothing total rate increases is beneficial to Local Bodies receiving both water and sewer service only, in FY 2017, the Authority began to smooth rates at the Sewer and Waterworks Systems level. Rate smoothing at the Systems level has created more sustainable and predictable rates for each System, which has helped mitigate short-term rate spikes and provide consistent rates for the Local Bodies that only receive one service from the Authority.

Table 8
Projected Rate Revenue Requirement Increases, FY 2019-2024
(\$ in 000's)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Sewer Rate Revenue	\$489,187	\$507,468	\$525,502	\$543,648	\$559,518	\$575,800
<u>Waterworks Rate Revenue</u>	<u>\$249,855</u>	<u>\$259,190</u>	<u>\$268,456</u>	<u>\$277,774</u>	<u>\$288,670</u>	<u>\$299,995</u>
Total Rate Revenue	\$739,042	\$766,657	\$793,958	\$821,422	\$848,188	\$875,795
Annual Rate Increase	3.1%	3.7%	3.6%	3.5%	3.3%	3.3%

Note: Totals may not add exactly due to rounding.

The projected rate revenue increases are the product of a large number of assumptions, including the rate of growth in Authority operating expenses and economic and financial assumptions. They also assume that the Authority uses the Rate Stabilization Fund as described in this Report.

4.2 Rate Allocation Methodology

The Authority's charges for the services of the Waterworks System and Sewer System, identified as Total Rate Revenue in the preceding table, are billed to Local Bodies on a wholesale basis. This means that the Authority bills Local Bodies, including special districts, rather than the individual residences or businesses served by the Systems. Separate charges applicable to the Waterworks System and Sewer System are established each year as required by the Enabling Act; these charges are established at levels at least sufficient, together with other available revenue, to pay the full annual revenue requirement, as described in subsequent sections.

4.2.1 Water Rate Methodology

Using an average cost methodology, the Authority's net annual Waterworks System costs for the current fiscal year, including operation and maintenance, debt service, and reserve fund requirements are recovered from Local Bodies in proportion to their prior calendar year annual water consumption. In FY 2019, the unit cost of water is \$3,963 per million gallons; and based on the Authority's projections the unit cost of water will be approximately \$4,024 per million gallons in FY 2020.

4.2.2 Contractual Agreements for Water Service

Twenty-four of the 51 water-served Local Bodies are "contract communities" in which water is supplied pursuant to water supply agreements. The list of water-served communities evolved through various legislative acts that allowed the communities/water districts to join the Waterworks System. The water supply agreements contain terms and conditions agreed to by the respective Local Body and the Authority. Nineteen of the 24 contract communities pay for water at the full water rates. The three CVA communities have a separate assessment. Southborough receives its first 150 million gallons per year at no charge. Clinton is also considered a water-served community; however, Clinton withdraws its first 800 million gallons of water per year from the Authority's water supply reservoirs via its own infrastructure free of charge under special legislation. There are four additional entities served by the Authority, including state hospitals and the DCR. The Authority has had and continues to have discussions with additional communities and Local Bodies regarding potential water sales to meet various needs. The Authority currently provides water services to five Local Bodies added to the Waterworks System since its inception.

4.2.3 Wastewater Rate Methodology

The Authority's wastewater rate methodology encompasses the following elements:

Operation and Maintenance Expense: Each Local Body's annual allocation in FY 2019 is based upon the average total annual metered flow for the prior three years from each community taking into account three separate prices for each portion of wastewater: total annual flow, pounds of suspended solids, and pounds of biochemical oxygen demand.

Capital Costs: A flow-based method, adjusted for strength, is used to recover one-quarter of the capital costs, and a population-based method is used to recover the remaining three-quarters. For each Local Body in FY 2019, flow calculations are based on the average of the month in the prior three calendar years in which the highest average daily flows occurred for that Local Body. The remaining share of capital costs is allocated based on population: 50 percent of the balance (37.5 percent of the total) assigned on the basis of the Local Body's total or census population and 50 percent of the balance (37.5 percent of the total) on the basis of the presently served population.

4.2.4 Enforceability of Charges

The Authority's charges to Local Bodies are a general obligation of the Local Bodies. Local Bodies fund payment of the Authority's wholesale rates and charges from several revenue sources, including local retail water and wastewater charges, real and personal property taxes, Commonwealth local aid distributions, or a combination of the preceding. In the event any charge to a Local Body is not paid when due, the Enabling Act authorizes the Authority to recover the amount due, together with interest and other actual damages, by action in the state Superior Court. Without suit, the Authority may also certify to the State Treasurer the amount of any unpaid charge from a Local Body (except the Boston Water and Sewer Commission, the Lynn Water and Sewer Commission, the Dedham-Westwood Water District, and the Lynnfield Water District, which collectively will account for approximately 31.6 percent of total rate revenues in FY 2019), whereupon the State Treasurer is required by the Act to deduct the amount due from any distribution of local aid then payable to such Local Body by the Commonwealth, if any, and instead to pay such amount to the Authority. The Authority has collected 100 percent of its rates and charges in each year of its existence. This local aid intercept has been used only eight times in total, and not since FY 1993. To date, 100 percent of the Authority's rates and charges were collected within 30 days of due dates, except for one instance in which the Authority made special arrangements with a Local Body to extend the due date.

The availability of Commonwealth local aid distributions in the future to satisfy unpaid charges imposed by the Authority with respect to those Local Bodies eligible to receive such distributions will be dependent upon, among other things, the aggregate amount actually appropriated to each Local Body by the state legislature in a fiscal year for local aid distribution, and to the extent to which a Local Body's local aid distribution may have already been accessed under other valid intercept mechanisms.

4.3 Retail Customer Impacts

The Local Bodies and their retail customers will continue to be impacted by the projected increases in the Authority's charges for water and wastewater service over the next several years. Local Bodies will be required to increase their contributions through retail user fee increases. Due to the variety of revenue sources used by the Local Bodies and the differences in service levels, it is difficult to accurately assess the impact of the projected increases in the Authority's charges on the average household in the Authority's service area. The Advisory Board annually surveys the Local Bodies and based on the 2018 *Annual Water and Sewer Retail Rate Survey*, the Advisory Board has estimated that during FY 2018 the average annual household charges for water and wastewater service across the 61 communities served by the Authority will total \$1,602 using an industry standard benchmark that the average household consumes 90,000 gallons per year. For FY 2019 and FY 2020, we project that the average household bill assuming 90,000 gallons for average annual consumption will increase to approximately \$1,707 and \$1,783, respectively. When making these projections, we have assumed (1) that the Local Body that provides retail services receives both water and sewer services from the Authority, (2) that the Local Body passes on to each household 100 percent of any Authority increases in the form of retail user fees, (3) that the Local Body's charges increase by 5.0 percent annually through FY 2024, and (4) that the Authority's charges constitute approximately 44 percent of the Local Bodies' charges in FY 2019.

Table 9 summarizes the projected annual household bills through FY 2024 assuming average household consumption of 90,000 gallons per year. Typical annual household bills are projected to increase to approximately \$2,112 in FY 2024. Of this amount, \$896 is the Authority wholesale charge and \$1,216 is the projected local charge.

These estimates of household charges are based on the assumptions regarding inflationary increases, long-term debt interest rates, state and federal assistance, estimates of additional operating expenses related to new facilities, and construction costs of new facilities. These estimated charges are, therefore, subject to change.

We believe that assuming average annual consumption of 90,000 gallons per year overstates residential consumption in many of the Local Bodies, and that most residential customers consume significantly less. Another benchmark that the Authority is using is based on 61,000 gallons per year per household, or 68 percent of the industry benchmark which the Authority believes tracks closer to actual consumption in its service area. Consequently, the average annual household bills described above and presented below are not reflective of the actual cost of water and sewer service being incurred by the Local Bodies' residential customers. At the consumption level of 61,000 gallons, the average retail bill during FY 2019 would be approximately \$1,157, and in FY 2024 the average bill is estimated to be \$1,431.

Table 9
Projected Typical Household Bills, FY 2019-2024
 (\$ in 000's)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Combined						
Local	\$953	\$1,000	\$1,050	\$1,103	\$1,158	\$1,216
<u>MWRA</u>	<u>\$754</u>	<u>\$783</u>	<u>\$810</u>	<u>\$838</u>	<u>\$867</u>	<u>\$896</u>
Total	\$1,707	\$1,783	\$1,861	\$1,941	\$2,025	\$2,112
Water						
Local	\$345	\$362	\$381	\$400	\$420	\$441
<u>MWRA</u>	<u>\$331</u>	<u>\$343</u>	<u>\$356</u>	<u>\$368</u>	<u>\$383</u>	<u>\$398</u>
Total	\$676	\$706	\$736	\$768	\$802	\$838
Sewer						
Local	\$608	\$638	\$670	\$703	\$738	\$775
<u>MWRA</u>	<u>\$423</u>	<u>\$439</u>	<u>\$455</u>	<u>\$470</u>	<u>\$484</u>	<u>\$498</u>
Total	\$1,031	\$1,077	\$1,124	\$1,174	\$1,222	\$1,274

The retail rates within the Authority’s service area are among the highest in the country according to the Advisory Board’s 2018 *Annual Water and Sewer Retail Rate Survey*. The survey found an average annual combined water and sewer household bill of approximately \$1,602 assuming 90,000 gallons of water use for all 61 communities served by the Authority. However, comparing the costs to households of water and sewer services across jurisdictions is difficult given differing methodologies in establishing user fees, capital assessments, general tax support, and the availability of state and federal financial assistance. In addition, it is important to take into account regional variations in water consumption and household income when assessing the impact of such bills on residential customers. The Authority believes that with these factors taken into account its service costs are comparable to many utilities across the country.

For certain segments of the Authority’s service area population, especially those with low and/or fixed incomes, we believe that the retail rates may be burdensome. If these increases are not mitigated in

some fashion, certain demographic groups within the retail customer base may find the projected increases unaffordable. However, Local Bodies have a variety of means for mitigating these impacts, including lifeline rates, subsidization from other revenue sources, and discounts for senior and low-income households.

Based upon our review, and recognizing the availability and use of retail rate alternatives by the Local Bodies, we are reasonably confident that the Authority's projected rates and charges will be within the ability of the individual Local Bodies and their collective retail customer base to afford.

5 Compliance with the General Bond Resolution

Table 10 summarizes our evaluation of the Authority's compliance with certain terms of the Resolution from FY 2019 through FY 2024. The data included in this table regarding non-rate revenues, operating expenses, debt service assistance and reserve fund deposits are described in prior sections. Rate revenue is described in the preceding section. In general, the Authority must generate sufficient rate revenue to meet all operating and capital expenses after accounting for non-rate revenue, such as debt service assistance and investment income. In addition, the Authority's total revenues must be sufficient to comply with the debt service coverage requirements of the Resolution.

Projected annual revenue requirements of the Authority, including operation and maintenance expenses, debt service, and deposits into the various reserve funds are discussed previously. The Authority may deposit certain year-end surpluses from operations into the Rate Stabilization Fund (line 18) and use the accumulated balance in this fund to mitigate the impact of future increases in revenue requirements, subject to the terms of the Resolution and management discretion. Year-end surpluses have resulted from favorable variances of capital financing and other operating expenses, and non-rate revenues.

In addition to meeting its yearly cash requirements, the annual revenues of the Authority must be adequate to comply with certain covenants of the Resolution, including the covenants prescribed in Section 705 as to annual level of rates and charges and the required annual debt service coverage ratio (the "Rate Covenant"), as well as the covenants outlined in Section 206 concerning conditions precedent to the issuance of additional revenue bonds (the "Additional Bonds Test"). (For a more complete description of these requirements, see the Official Statement, of which this Appendix B is a part, including Appendix C, Summary of Certain Provisions of the General Bond Resolution.)

In order to comply with the Rate Covenant, annual revenues of the Authority must be adequate to: (1) meet all annual revenue requirements including operation and maintenance expenses, *pro rata* debt service fund deposits, and reserve fund requirements; and (2) provide revenue available for revenue bond debt service payments in each fiscal year equal to the sum of the Primary and Secured Bond Coverage Ratios. Revenue available from current year operations must provide the Primary Bond Coverage Ratio of 120 percent.

The Authority is also required to maintain Revenues Available for Bond Debt Service at a level equal to 110 percent of debt service on all senior and secured bonds, including bonds issued to the SRF (Secured Bond Rate Covenant).

As shown on lines 23 through 25 of Table 10, the Authority is projected to generate sufficient revenues to comply with the applicable coverage requirements. The projected Primary Bond Coverage Ratio (line 24) exceeds the 120 percent requirement for all forecasted years. The Secured

Bond Coverage Ratio (line 25) is projected to equal or surpass the 110 percent level in all forecasted years.

Table 10
Projected Compliance with Resolution, FY 2019-2024
 (\$ in 000's)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Revenues						
1 Non-Rate Revenues:						
2 Investment Income	\$13,559	\$15,504	\$16,366	\$16,677	\$18,234	\$19,287
3 Rate Stabilization Fund	\$0	\$0	\$0	\$0	\$0	\$0
4 Miscellaneous	\$15,342	\$14,870	\$15,192	\$15,521	\$15,435	\$15,693
5 <u>Rate Revenue Requirement</u>	<u>\$739,042</u>	<u>\$766,657</u>	<u>\$793,958</u>	<u>\$821,422</u>	<u>\$848,188</u>	<u>\$875,795</u>
6 Total Revenue	\$767,944	\$797,031	\$825,516	\$853,620	\$881,856	\$910,774
7 Operating Expenses	\$251,712	\$264,232	\$273,586	\$281,945	\$290,067	\$298,491
8 Chelsea Facility Lease	\$3,217	\$3,217	\$3,217	\$3,217	\$3,217	\$3,217
9 <u>Other Post-Employment Benefits</u>	<u>\$5,574</u>	<u>\$5,962</u>	<u>\$6,065</u>	<u>\$6,149</u>	<u>\$6,210</u>	<u>\$6,249</u>
10 Net Operating Revenues	\$507,441	\$523,620	\$542,648	\$562,309	\$582,362	\$602,817
Debt Service						
12 Senior Debt Service	\$272,634	\$204,716	\$286,774	\$278,986	\$342,441	\$349,339
13 Debt Service Assistance & Bond Redemption Account	(\$945)	\$0	\$0	\$0	\$0	\$0
14 Secured Debt Service	<u>\$181,413</u>	<u>\$263,726</u>	<u>\$193,157</u>	<u>\$222,132</u>	<u>\$172,904</u>	<u>\$160,219</u>
15 Total Debt Service	\$453,102	\$468,442	\$479,932	\$501,118	\$515,345	\$509,558
16 Watershed and PILOT	\$26,406	\$27,195	\$28,011	\$28,851	\$29,716	\$30,608
17 Reserve Fund Deposits	\$1,882	\$2,087	\$1,559	\$1,393	\$1,354	\$1,404
18 Rate Stabilization Fund Deposits	\$0	\$0	\$0	\$0	\$0	\$0
19 Current Revenue for Capital	\$14,200	\$15,200	\$16,200	\$17,200	\$18,200	\$19,200
20 CP Interest for Water Pipeline Program	\$4,750	\$5,847	\$5,847	\$5,847	\$5,847	\$5,847
21 Debt Service Defeasance	\$7,100	\$4,850	\$11,100	\$7,900	\$11,900	\$36,200
22 Balance Available Year End	\$0	\$0	\$0	\$0	\$0	\$0
23 Rate Covenant Test						
24 Primary Coverage¹	1.87	2.56	1.89	2.02	1.70	1.73
25 Secured Coverage²	1.12	1.12	1.13	1.12	1.13	1.18

¹ Primary Coverage equals Net Revenues divided by Senior Debt.

² Secured Coverage equals Net Revenues divided by Total Debt.

Note: Totals may not add exactly due to rounding.

SUMMARY OF CERTAIN PROVISIONS OF THE GENERAL RESOLUTION

The following is a brief summary of certain provisions of the Massachusetts Water Resources Authority (the “Authority”) Amended and Restated General Revenue Bond Resolution, that became effective on April 23, 2015 (as amended and supplemented to date, the “General Resolution”). Certain modifications to the General Resolution were approved by the Authority’s Board of Directors on January 10, 2007 and all but one are currently reflected in the General Resolution. The one additional modification that is pending relates to the general Bondholder consent requirement which, upon its effectiveness, would be reduced from the holders of two-thirds of the outstanding principal amount of each Series of Secured Bonds affected by a proposed amendment to the holders of 51% of the outstanding principal amount of such Series of Secured Bonds (the “Proposed Amendment”) and will be effective only upon the consent of 100% in aggregate principal amount of the Secured Bonds Outstanding at the time such Proposed Amendment becomes effective and compliance with other provisions in the General Resolution and in other documents of the Authority applicable to amendments. See the caption “Powers of Amendment,” herein. The Authority intends to request that the initial purchasers of this and each future Series of Secured Bonds, including an underwriter purchasing such Secured Bonds for reoffering, will consent to the Proposed Amendment at the time of original issue of each Series and each subsequent Bondholder will purchase such Secured Bond subject to the Proposed Amendment. Each Bondholder will be deemed to have consented to the Proposed Amendment upon its purchase of the 2019 Bonds.

By their acceptance of the 2019 Bonds and any future Series of Secured Bonds, the owners thereof will (i) agree to all the terms of the General Resolution as currently in effect and the Proposed Amendment, (ii) waive the applicability of the provisions of the General Resolution affected by such Proposed Amendment, and (iii) agree to any amendments to the General Resolution that may be necessary, in the opinion of Bond Counsel, to effect such Proposed Amendment.

This summary does not purport to be complete and reference is made to the General Resolution for full and complete statements of its terms and provisions. In particular and without limitation, this summary does not include a description of the provisions of the Twenty-Fourth Supplemental Resolution relating to the Authority’s Multi-Modal Subordinated General Revenue Bonds, 1999 Series B, the Twenty-Seventh Supplemental Resolution relating to the Authority’s Tax-Exempt Commercial Paper Notes, Series 1999, the Thirty-Ninth Supplemental Resolution relating to the Authority’s Multi-Modal Subordinated General Revenue Refunding Bonds, 2002 Series C and 2002 Series D, the Fifty-Fourth Supplemental Resolution relating to the Authority’s Multi-Modal Subordinated General Revenue Refunding Bonds, 2008 Series A through F, the Sixty-Fourth Supplemental Resolution relating to the Authority’s Subordinated General Revenue Bonds, 2012 Series E, 2012 Series F and 2012 Series G, the Sixty-Seventh Supplemental Resolution relating to the Authority’s Multi-Modal Subordinated General Revenue Refunding Bonds, 2014 Series A and 2014 Series B, the Seventieth Supplemental Resolution relating to the Authority’s Subordinated General Revenue Notes, 2015 Series C, and the Seventy-Seventh Supplemental Resolution relating to the Authority’s Multi-Modal Subordinated General Revenue Refunding Bond, 2018 Series A, each as amended to the date of this Information Statement.

“Accountant” shall mean CliftonLarsenAllen LLP or any independent certified public accountant (or a firm thereof) of recognized standing, selected by the Authority and satisfactory to the Trustee and may be the accountant regularly auditing the books of the Authority.

“Adjusted Debt Service” for any period of time, with respect to any category or Series of Secured Bonds shall mean, the Debt Service for such period of time with respect to such Series except that, if any Refundable Principal Installment of such Series is included in Debt Service for such period of time, Adjusted Debt Service shall mean Debt Service determined as if such Refundable Principal Installment had been payable over a period extending from the due date of such Refundable Principal Installment through the date identified in the Supplemental Resolution authorizing such Series (which date may be no later than the last date on which such Series could have been stated to mature under the Act as in effect on the date of issuance of such Series), in installments which would have required level annual payments of the sum of Principal Installments and interest over such period. Interest deemed payable in any period of time after the actual due date of any Refundable Principal Installment of any Series of Secured Bonds shall be calculated at the applicable Refundable Principal Installment Pro Forma Interest Rate (using the actuarial method of calculation).

APPENDIX C

“Aggregate Adjusted Debt Service” shall mean, for any Fiscal Year, and with respect to Bonds or Subordinated Bonds, the aggregate of the Adjusted Debt Service on all Series of Bonds or Subordinated Bonds for such Fiscal Year.

“Authorized Representative” shall mean, with respect to the Authority, the Chairman, the Vice Chairman, the Executive Director, the Director of Finance or the Treasurer of the Authority and, when used in reference to an act or document, shall also mean any other person authorized by resolution of the Authority to perform such act or sign such document.

“Bond” or “Bonds” shall mean any bonds, notes or other evidences of indebtedness, as the case may be, authenticated and delivered pursuant to the General Resolution in the manner described under the heading Conditions Precedent to Delivery of a Series of Bonds and shall also mean any Parity Bond Anticipation Notes and any Parity Reimbursement Obligation incurred with respect to Bonds, but shall not mean Subordinated Bonds, other Bond Anticipation Notes or other Indebtedness.

“Bond Anticipation Notes” shall mean any of the notes issued in anticipation of a Series of Secured Bonds pursuant to the General Resolution and shall include, unless the context otherwise indicates, Parity Bond Anticipation Notes and Subordinated Parity Bond Anticipation Notes.

“Bond Counsel’s Opinion” shall mean an opinion by McCarter & English, LLP, or any attorney or firm of attorneys of nationally recognized standing in the field of law relating to revenue bonds of public instrumentalities, selected by the Authority and satisfactory to the Trustee and may be an attorney or firm regularly providing services to the Authority.

“Business Day” shall mean any day other than a Saturday, a Sunday or any other day on which any Fiduciary is authorized or required by law to be closed for business.

“Capital Budget” shall mean the capital expenditure budget of the Authority as in effect from time to time in accordance with Section 8(b) of the Act and the General Resolution.

“Capital Improvements” shall mean extensions, improvements, enlargements, betterments, alterations, renewals and replacements of the System or other property of the Authority (including land, equipment and other real or personal property), which (i) is used or useful in connection with the System or any part thereof, (ii) is constructed, acquired or made by or on behalf of the Authority subsequent to the date of adoption of the General Resolution, and (iii) is properly chargeable (whether or not so charged by the Authority) according to generally accepted accounting principles, as additions to utility plant accounts.

“Code” shall mean the Internal Revenue Code of 1986, as amended, including any regulations promulgated thereunder or applicable thereto.

“Commonwealth Obligations” shall mean obligations of the Authority payable to the Commonwealth, including without limitation obligations with respect to principal of, premium, if any, or interest on Commonwealth debt required to be paid by the Authority under applicable law, amounts payable to the Commonwealth pursuant to Section 5(b) of the Act, state taxes, payments in lieu of taxes collected by the Commonwealth on behalf of any municipality, payments on account of administrative costs of the Watershed Division and state governmental charges of all other kinds, but not including Water Pollution Abatement Obligations; and shall also include Special Payment Obligations, which shall be payable equally and ratably with all other Commonwealth Obligations.

“Consulting Engineer” shall mean CDM Smith Inc. or any independent engineer or firm of engineers selected by the Authority pursuant to the General Resolution.

“Costs” as applied to any Project, shall mean all or any part of the cost, paid by or on behalf of or reimbursable by or to the Authority, of undertaking and carrying out such Project including, without limitation, any item of “cost” as defined in the Act.

“Credit Facility” shall mean a letter of credit, revolving credit agreement, standby purchase agreement, surety bond, insurance policy or similar obligation, arrangement or instrument issued by a bank, insurance company or other financial institution, the senior long term debt obligations of which (or the holding company of any bank) are rated in either of the highest two rating categories by each Rating Agency which provides for payment of all or a portion of the Principal Installments or interest due on any Series of Secured Bonds or provides funds for the purchase of such Secured Bonds or portions thereof.

“Current Expenses” shall mean any expenses incurred by or for the account of the Authority or reimbursable by or to the Authority for maintaining, repairing or operating the System and engaging in other activities authorized by the Act including, without limiting the generality of the foregoing, any item of “current expense” as defined in the Act, amounts defined herein as Operating Expenses, Debt Service, Commonwealth Obligations or Water Pollution Abatement Obligations, and other current expenses required or permitted by law to be paid by or reimbursable to the Authority.

“Debt Service” for any period of time shall mean, as of any date of calculation and with respect to any Series of Indebtedness, an amount equal to the sum of (i) interest payable during such period of time on Indebtedness of such Series (including any interest payable on any Parity Bond Anticipation Notes), except to the extent that such interest is to be paid from amounts representing Capitalized Interest and (ii) the Principal Installments of the Indebtedness of such Series payable during such period of time. Such interest and Principal Installments for such Series shall be calculated on the assumption that (x) no Indebtedness of such Series Outstanding at the date of calculation will cease to be Outstanding except by reason of the payment thereof upon stated maturity or upon mandatory redemption by application of Sinking Fund Installments and (y) as to future period, Variable Rate Indebtedness will bear interest at the greater of (A) the rate or rates which were assumed by the Authority in the current Operating Budget to be borne by such Variable Rate Indebtedness during such period or (B) the weighted average of the actual rate or rates borne by such Variable Rate Indebtedness over the preceding month, or (C) but only for the first Fiscal Year in which such Variable Rate Indebtedness is Outstanding, the interest rate stipulated by the Authority in the Supplemental Resolution authorizing such Indebtedness.

“Defeasance Obligations” shall mean the obligations described in clause (a), (b), (c), (d) or (j) of the definition of Investment Securities; provided that such obligations shall not be redeemable prior to the maturity date or stated redemption date relied upon in satisfying the conditions of the General Resolution with respect to defeasance.

“Designated Debt” shall mean any Series of Secured Bonds with respect to which there shall be in effect a Qualified Swap.

“Depository” shall mean any bank or trust company selected by the Authority, as the case may be, as a depository of moneys to be held under the provisions of the General Resolution, any may include the Trustee.

“Event of Default” shall mean any event specified as such in the General Resolution.

“Fiduciary” shall mean the Trustee or any Paying Agent or Depository.

“Financial Guaranties” shall mean one or more of the following: (i) irrevocable, unconditional and unexpired letters of credit issued by banking institutions the senior long-term debt obligations of which (or the holding company of any such banking institution) have (at the time of issue of such letter of credit) a rating in either of the two highest categories from each Rating Agency; or (ii) an irrevocable and unconditional policy or policies of insurance in full force and effect issued by municipal bond insurers or multiline insurers the obligations insured by which are eligible for a rating in either of the two highest categories from each Rating Agency; in each case providing for the payment of sums for the payment of Principal Installments of and interest on Secured Indebtedness in the manner provided in the General Resolution; and providing further that any such Financial Guaranty must be drawn upon on a date which is at least seven (7) days prior to the expiration date of such Financial Guaranty in an amount equal to the deficiency which would exist if the Financial Guaranty expired, unless a substitute Financial Guaranty is acquired prior to such expiration data as provided in a related Supplemental Resolution.

APPENDIX C

“Fiscal Year” shall mean the twelve-month period commencing July 1 of any calendar year and ending June 30 of the succeeding calendar year or such other twelve-month period as may be provided by the Act or authorized by the Authority pursuant to the Act.

“Governmental Obligations” shall mean direct general obligations of, or obligations the timely payment of principal of and interest on which are unconditionally guaranteed by, the United States of America.

“Grant Agreements” shall mean any and all agreements between the Authority (by original execution or by transfer from the Metropolitan District Commission pursuant to the Act) and the United States of America or the Commonwealth, or any agency, department, bureau, commission or other instrumentality of either thereof, all as the same may be amended or supplemented from time to time, providing for or relating to the provision of Grant Receipts to the Authority.

“Grant Receipts” shall mean any money received by or on behalf of the Authority under or pursuant to a Grant Agreement as or on account of a grant or contribution, heretofore or hereafter made, in aid of or with respect to any Project (including without limitation any such moneys received by the Commonwealth or the Metropolitan District Commission in trust for the Authority pursuant to Sections 4 and 5 of the Act as or on account of a grant or contribution, heretofore made, in aid of or with respect to any improvement to the System).

“Indebtedness” shall mean indebtedness for borrowed money of the Authority, including without limitation all Bonds, Subordinated Bonds, Bond Anticipation Notes, Reimbursement Obligations, Special Subordinated Indebtedness and the Prior Notes but shall not include Special Payment Obligations.

“Investment Securities” shall mean and include any of the following securities, if and to the extent the same are at the time legal investments by the Authority of the funds to be invested therein and conform to the policies set forth in any investment guidelines adopted by the Authority or by a duly appointed subcommittee of its Board of Directors and in effect at the time of the making of such investment:

- (a) Government Obligations;
- (b) Certificates or receipts representing direct ownership of future interest or principal payments on Government Obligations or any obligations of agencies or instrumentalities of the United States of America which are backed by the full faith and credit of the United States, which obligations are held by a custodian in safekeeping on behalf of the holders of such receipts;
- (c) Bonds, debentures, notes or other evidences of indebtedness issued by any of the following: Federal Home Loan Mortgage Corporation; Student Loan Marketing Association; Federal Home Loan Banks; Federal National Mortgage Association; Government National Mortgage Association; Bank for Cooperatives; Federal Intermediate Credit Banks; Federal Financing Bank; Export-Import Bank of the United States; Federal Land Banks; or any other agency or instrumentality of the United States of America; or the International Reconstruction Development Bank;
- (d) All other obligations issued or unconditionally guaranteed as to the timely payment of principal and interest by an agency of person controlled or supervised by and acting as an instrumentality of the United States of America pursuant to authority granted by Congress;
- (e) Interest-bearing time or demand deposits, certificates of deposit, or other similar banking arrangements with any government securities dealer, bank, trust company, savings and loan association, national banking association or other savings institution (including the Trustee), provided that such deposits, certificates, and other arrangements are fully insured by the Federal Deposit Insurance Corporation or the Federal Savings and Loan Insurance Corporation or (ii) interest-bearing time or demand deposits or certificates of deposit with any bank, trust company, national banking association or other savings institution (including the Trustee), provided such deposits and certificates are in or with a bank, trust company, national banking association or other savings institution whose long-term unsecured debt is rated in one of the three highest long-term rating categories by S&P and Moody’s (if such rating agencies are Rating Agencies) and,

if rated by any other Rating Agency, rated in the three highest rating categories of such Rating Agency, and provided further that with respect to (i) and (ii) any such obligations are held by the Trustee or a bank, trust company or national banking association (other than the issuer of such obligations, unless the issuer is the Trustee);

(f) Repurchase agreements collateralized by securities described in subparagraphs (a), (b), (c) or (d) above with any registered broker/dealer or with any commercial bank, provided that (1) a specific written repurchase agreement governs the transaction, (2) the securities are held, free and clear of any lien, by the Trustee or an independent third party acting solely as agent for the Trustee, and such third party is (a) a Federal Reserve Bank, or (b) a bank which is a member of the Federal Deposit Insurance Corporation and which has combined capital, surplus and undivided profits of not less than \$25 million, and the Trustee shall have received written confirmation from such third party that it holds such securities, free and clear of any lien, as agent for the Trustee, (3) the repurchase agreement has a term of thirty days or less, or the Trustee will value the collateral securities no less frequently than monthly and will liquidate the collateral securities if any deficiency in the required collateral percentage is not restored within five business days of such valuation, and (4) the fair market value of the collateral securities in relation to the amount of the repurchase obligation, including principal and interest, is equal to at least 102%;

(g) Money market funds rated in the highest category by S&P and Moody's (if such rating agencies are Rating Agencies) and, if rated by any other Rating Agency, rated in the highest rating category of such Rating Agency;

(h) Commercial paper rated in the highest rating category by S&P and Moody's (if such rating agencies are Rating Agencies) and, if rated by any other Rating Agency, rated in the highest rating category of such Rating Agency;

(i) Shares of investment companies or cash equivalent investments which are authorized to invest only in assets or securities described in subparagraphs (a), (b), (c), (d) and (f) above;

(j) Obligations the interest on which is excluded from gross income for purposes of federal income taxation that have been advance-refunded prior to their maturity and that are fully and irrevocably secured as to principal and interest by Government Obligations, or Government Obligations which have been stripped of their unmature interest coupons and interest coupons stripped from Government Obligations, held in trust for the payment thereof which obligations are rated in the highest rating category by each Rating Agency;

(k) Short-term or long-term obligations the interest on which is excludable from gross income for Federal income tax purposes and that are rated in the three highest rating categories by S&P and Moody's (if such rating agencies are Rating Agencies) and, if rated by any other Rating Agency, rated in the three highest rating categories of such Rating Agency, or shares of investment companies or cash equivalent investments which are authorized to invest primarily in such obligations;

(l) participation units in a combined investment fund created under Section 38A of Chapter 29 of the General Laws of the Commonwealth;

(m) investment contracts with banks or other financial institutions whose long-term unsecured debt or claims-paying ability is rated in one of the three highest rating categories by S&P and Moody's (if such rating agencies are Rating Agencies) and, if rated by any other Rating Agency, rated in the three highest rating categories of such Rating Agency; and

(n) forward purchase agreements for the delivery of securities described in subparagraph (a), (b), (c), (d), (h) or (k) above from financial institutions rated in one of the three highest rating categories by S&P and Moody's (if such rating agencies are Rating Agencies) and, if rated by any other Rating Agency, rated in one of the three highest rating categories by such Rating Agency; and

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(o) any other investment authorized pursuant to an amendment or supplement hereto pursuant to the General Resolution.

Obligations of any Fiduciary or an affiliate thereof may be Investment Securities, provided that they otherwise qualify.

“Local Body Default” shall mean a default in the payment of any Rates and Charges due to the Authority by a Local Body, as certified by an Authorized Representative of the Authority in accordance with the provisions of the General Resolution.

“Moody’s” shall mean Moody’s Investors Service Inc.

“Net Revenues” shall mean with respect to a period to time all Revenues accrued in such period in accordance with general accepted accounting principles less the Operating Expenses incurred or payable during such period in accordance with generally accepted accounting principles; provided, however, that the proceeds of revenue anticipation notes shall not constitute Revenues and the principal amount of such notes shall not constitute Operating Expenses for the purpose of calculating Net Revenues.

“Operating Budget” shall mean the Operating Budget duly adopted by the Authority in the same manner as its Current Expense Budget, except as provided in the General Resolution, as amended from time to time, in accordance with the General Resolution, which Operating Budget may constitute a portion of, or an exhibit or appendix to, such Current Expense Budget.

“Operating Expenses” shall mean the Authority’s expenses, whether or not annually recurring, of maintaining, repairing and operating the System and engaging in other activities authorized by the Act including, without limiting the generality of the foregoing, amounts for administrative expenses including costs of salaries and benefits and amounts required to finance pension benefits earned by employees of the Authority, as provided in the Act; cost of insurance, payments for engineering, financial, accounting, legal and other services rendered to the Authority, payments under any interest rate exchange, cap, or other hedge agreement which have been designated by the authority as Operating Expenses for purposes of the General Resolution in such agreement; costs incurred or payable by the Authority with respect to the System Real Property (as defined in the Act); costs of issuance not financed in the Costs of a Project paid by the Authority; and payments of interest on revenue anticipation notes and other Current Expenses; but not including depreciation, recognition upon disposal or other retirement of a capital asset, Debt Service payable from any Fund or Account established hereunder, Commonwealth Obligations, Water Pollution Abatement Obligations, Special Payment Obligations, and expenses incurred in connection with a separate facility financing as described under “Additional Indebtedness - Special Subordinated Indebtedness.”

“Option Bonds” shall mean Secured Bonds which by their terms may be tendered by and at the option of the owner thereof for purchase or payment by the Authority prior to the stated maturity thereof.

“Outstanding”, when used with reference to Bonds or any other Indebtedness, shall mean, as of any date, all Bonds or other evidences of Indebtedness theretofore or thereupon being authenticated and delivered under the General Resolution except:

(a) any Bonds or other evidences of Indebtedness canceled by the Trustee at or prior to such date;

(b) any Bond or other evidence of Indebtedness (or portion thereof) for the payment or redemption of which there shall be set aside and held in trust hereunder either; (i) moneys in an amount sufficient to pay when due the Principal Installments or Redemption Price thereof, together with all accrued interest, (ii) Defeasance Obligations in such principal amounts, of such maturities, bearing such interest and otherwise having such terms and qualifications, as are necessary to provide moneys (whether as principal or interest) in an amount sufficient to pay when due the Principal Installments or Redemption Price thereof, together with all accrued interest, or (iii) any combination of (i) and (ii) above, and, if such Bond or other evidence of Indebtedness or portion thereof is to be redeemed, for which notice of redemption has been given

as provided in the General Resolution, or the applicable Supplemental Resolution, or provision satisfactory to the Trustee has been made for the giving of such notice;

(c) any Bond or other evidence of Indebtedness in lieu of or in substitution for which other Bonds or other evidences of Indebtedness have been authenticated and delivered; and

(d) any Bond or other evidence of Indebtedness deemed to have been paid as provided in the General Resolution.

“Parity Bond Anticipation Notes” shall mean Bond Anticipation Notes the interest on which is payable from and secured by a pledge of, and a lien on, the Revenues on a parity with the lien created by the General Resolution to secure the Bonds.

“Parity or Senior Secured Bonds” shall mean any Secured Bonds issued on a parity with or senior to the SRF Bonds.

“Parity Reimbursement Obligation” shall mean a Reimbursement Obligation the payment of which is secured by a pledge of, and a lien on, Revenues on a parity with the lien created in favor of a class of Secured Bonds by the General Resolution.

“Parity Subordinated Bonds” shall mean the Authority’s General Revenue Bonds (Subordinated Series), 2005 Series D originally issued on November 16, 2005 and each Series of Subordinated Bonds or Bond Anticipation Notes theretofore or thereafter issued on a parity with such 2005 Series D Subordinated Bonds, and shall also mean any Subordinated Parity Bond Anticipation Notes and any Parity Reimbursement Obligations incurred with respect to Parity Subordinated Bonds.

“Payment Date” shall mean, with respect to any class of Secured Bonds, each date on which interest or a Principal Installment or both shall be due and payable on any of such Outstanding Secured Bonds according to their respective terms.

“Primary Bond Coverage Requirement” shall mean, for any twelve-month period, the product of the Primary Bond Coverage Ratio and the Required Debt Service Fund Deposits for all Outstanding Bonds for such period.

“Principal Installment” shall mean, as of any date of calculation and with respect to any Series of Secured Indebtedness, so long as any obligations of such Series are Outstanding, (i) the principal amount of obligations of such Series due on a certain future date for which no Sinking Fund Installments have been established or (ii) the unsatisfied balance of any Sinking Fund Installments due on a certain future date for obligations of such Series. For the purposes of the preceding sentence, “Principal Amount” shall include (x) any amount designated in, or determined pursuant to, the applicable Supplemental Resolution, as the “principal amount” with respect to any Bonds or Subordinated Bonds which do not pay full current interest for all or any part of their term, (y) the Tender Option Price of any Option Bonds which may be tendered to the Authority for purchase or payment prior to the stated maturity thereof in accordance with the terms of the Supplemental Resolution authorizing such Option Bonds, unless such amount is secured by a Credit Facility which is not in default and (z) the principal amount of any Parity Reimbursement Obligation. Principal Installment shall, however, not include the principal of Bond Anticipation Notes.

“Pro Forma Bond Issue” shall mean when used with reference to the Debt Service Reserve Fund Requirement or the Subordinated Debt Service Reserve Fund Requirement in connection with a Series of Variable Rate Indebtedness, the hypothetical fixed rate long-term bond issue set forth in the Supplemental Resolution authorizing such Series, having (i) the same maturities (and sinking fund provisions, if any) as the Series of Variable Rate Indebtedness to which it relates and (ii) such interest rate or rates as the Authority shall reasonably deem to be the equivalent of the rates which would have been borne by such Series of Variable Rate Indebtedness if such Series had been issued as a Series of Fixed Rate Indebtedness; provided that such interest rate shall be not less than 80% of the “30-year revenue bond index” the most recently published by The Bond Buyer or, if such index is no longer published such other substantially comparable index as determined by the Authority with the approval of the Trustee.

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“Project” shall mean any undertaking or other activity by or on behalf of the Authority to maintain, improve or enlarge the System or to maintain, improve or enlarge any facilities owned or operated by any Local Body the maintenance, improvement or enlargement of which directly or indirectly affects the Waterworks Operations or Sewer Operations of the Authority or to acquire, construct, maintain, improve or enlarge any other facilities or properties to be lawfully owned or operated by the Authority including, without limitation, any “project” as defined in the Act.

“Qualified Swap” shall mean an interest rate exchange, cap or other hedge agreement (a) whose Designated Debt is all or part of a particular Series of Secured Bonds and (b) which has been designated to the Trustee by the Authority as a Qualified Swap with respect to such Secured Bonds.

“Rates and Charges” shall mean all charges, whether denominated as charges, fees, rates, assessments or otherwise, established by the Authority for the water supply or sewer services provided by the Authority.

“Rating Agencies” shall mean Moody’s and S&P and their respective successors and assigns if such rating agencies are maintaining a rating on the Secured Bonds at the request of the Authority, and shall also include any other rating agency nationally recognized for skill and expertise in rating the credit of obligations such as the Secured Bonds and which is maintaining a rating on the Secured Bonds at the request of the Authority.

“Rebate Fund Requirement” means, as of any date of calculation, an amount equal to the aggregate of the amounts, if any, specified in each Series Resolution authorizing the issuance of a Series of Indebtedness as the amount required to be maintained in the Rebate Fund with respect to such Indebtedness.

“Redemption Price” shall mean, when used with respect to a Secured Bond or portion thereof, the principal amount thereof plus the applicable premium, if any, payable upon either optional or mandatory redemption thereof pursuant to the General Resolution.

“Refundable Principal Installment” shall mean any Principal Installment for any Series of Bonds or Subordinated Bonds which the Authority intends to pay with moneys which are not Revenues, provided that such intent shall have been expressed in the Supplemental Resolution authorizing such Series of Bonds or Subordinated Bonds and provided further that such Principal Installment shall be a Refundable Principal Installment only until the date of adoption of the Rates and Charges for the Fiscal Year (after which time such Refundable Principal Installment shall be treated as payable in level payments of the sum of the Principal Installments and interest over a five-year period commencing in such Fiscal Year at an interest rate determined by the Authority, set forth on a Certificate based on then prevailing interest rates for obligations such as the Bonds or the Subordinated Bonds, as the case may be) in which such Principal Installment comes due unless the Authority has delivered to the Trustee a Certificate of an Authorized Representative to the effect that it has made provision for the payment of such Principal Installment from a source other than Revenues.

“Refundable Principal Installment Pro Forma Interest Rate” shall mean, when used with reference to a Refundable Principal Installment, such hypothetical fixed interest rate as the Authority shall designate in the Supplemental Resolution authorizing such Refundable Principal Installment, based on then prevailing interest rates for obligations such as the Bonds or the Subordinated Bonds, as the case may be, to be the net interest cost which would have been borne by the Bonds or the Subordinated Bonds, as the case may be, constituting such Refundable Principal Installment if they had been payable on a level debt service basis over a period from the due date of such Refundable Principal Installment through the date identified in the Supplemental Resolution authorizing such Refundable Principal Installment (which date may be no later than the last date on which such Refundable Principal Installment could have been stated to mature under the Act as in effect on the date of issuance of such Refundable Principal Installment).

“Regularly Scheduled Qualified Swap Payments” shall mean the regularly scheduled payments under the terms of Qualified Swap which are payable by the Authority absent any termination, default or dispute in connection with such Qualified Swap.

“Reimbursement Obligation” shall mean the obligation of the Authority described in the General Resolution to reimburse the issuer of a Credit Facility for amounts paid by such issuer thereunder together with interest thereon, whether or not such obligation to so reimburse is evidenced by a promissory note or other similar instrument.

“Renewal and Replacement Reserve Cash Requirement” shall mean the greater of (a) the lesser of (i) the Renewal and Replacement Reserve Fund Requirement and (ii) \$10,000,000 and (b) the Renewal and Replacement Reserve Requirement minus the unutilized credit available to the Authority under any commercial paper program or committed line of credit established by the Authority for the purpose of financing capital spending of the Authority.

“Required Debt Service Fund Deposits” shall mean, for any period of time, all deposits made to the Principal and Interest Accounts of the Debt Service Fund for such period whether pursuant to the flow of funds provisions, application of investment earnings provisions or any other provision of the General Resolution (but shall not include amounts transferred from the Capitalized Interest Account, amounts paid from state debt service assistance which the Authority elects not to include in Revenues or other funds of the Authority that are not Revenues and are not transferred from other Funds or Accounts established under the General Resolution).

“Required Debt Service Fund Deposits” shall mean, for any period of time, all deposits made to the Principal and Interest Accounts of the Debt Service Fund for such period whether pursuant to the provisions of the General Resolution described in paragraph (a) under the heading Flow of Funds from the Revenue Fund or provisions regarding transfer of investment earnings described in paragraph (b) under the heading Investment of Certain Funds (including earnings retained in the Debt Service Fund) or any other provision of the General Resolution or any Supplemental Resolution, but shall not include amounts transferred from the Capitalized Interest Account or amounts paid from state debt service assistance which the Authority elects not to include in Revenues or other funds of the Authority that are not Revenues and are not transferred from other Funds or Accounts established under the General Resolution. For the purpose of this definition, for each Series of Designated Debt consisting of Bonds for any period, the amount required to be deposited into the Interest Account of the Subordinated Debt Service Fund pursuant to the provisions of the General Resolution described in clauses (a)(iii)(B) and (a)(iii)(E) under the heading Flow of Funds from the Revenue Fund shall be deemed to be solely the Regularly Scheduled Qualified Swap Payments relating to such Series of Designated Debt provided in the applicable Qualified Swap (and calculated, if variable in rate, as provided in the definition of “Debt Service”).

“Required Subordinated Debt Service Fund Deposits” shall mean, for any period of time, all deposits required to be made to the Principal and Interest Accounts of the Subordinated Debt Service Fund for such period with respect to Parity Subordinated Bonds, whether pursuant to the provisions of the General Resolution described in paragraph (a) under the heading Flow of Funds from the Revenue Fund or provisions regarding transfer of investment earnings described in paragraph (b) under the heading Investment of Certain Funds (including earnings retained in the Subordinated Debt Service Fund) or any other provision of the General Resolution or any Supplemental Resolution providing for the issuance of Parity Subordinated Bonds, provided; however, that such deposits shall not include amounts transferred from the Capitalized Interest Account or amounts paid from state debt service assistance which the Authority elects not to include in Revenues or other funds of the Authority that are not Revenues and are not transferred from other Funds or Accounts established under the General Resolution. For purposes of determining Required Subordinated Debt Service Fund Deposits with respect to any Series of Parity Subordinated Bonds constituting Water Pollution Abatement Obligations, such deposit requirements shall be determined in accordance with any debt service schedule set forth in the Supplemental Resolution or other agreement or instrument relating to such Series of Parity Subordinated Bonds that identifies loan payments net of contract assistance and reserve fund earnings, if applicable, as adjusted from time to time, but no adjustment on account of a failure to receive payment of any investment in such a reserve fund or of any contract assistance shall be required to be made unless the Authority shall determine to do so and, further, no adjustment on account of the use of a reserve fund to cover a payment default shall be required, unless the Authority shall determine to do so, in determining Required Subordinated Debt Service Fund Deposits occurring prior to the earlier of (i) eighteen months following the date which follows the occurrence of the event resulting in the increased loan payment or (ii) the next establishment by the Authority of its Rates and Charges which can feasibly incorporate the increased loan payment resulting from such event. For the purpose of this definition, for each Series of Designated Debt consisting of Parity Subordinated Bonds for any period, the amount required to be deposited into the Interest Account of the Debt Service Fund pursuant to the provisions of the General Resolution described in clauses (a)(ii)(B) and (a)(ii)(E) under the heading Flow of Funds from the Revenue Fund shall be deemed to be solely the Regularly Scheduled Qualified Swap Payments

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relating to such Series of Designated Debt provided in the applicable Qualified Swap (and calculated, if variable in rate, as provided in the definition of “Debt Service”).

“Revenues” shall mean and include all income, revenue, receipts, and other moneys derived by the Authority from its operation of the Systems and engaging in other activities authorized by the Act and all accounts, general intangibles and contract or other rights to receive the same, whether existing at the date of adoption of a General Resolution or thereafter coming into existence and whether held by the Authority at such date or thereafter acquired, and the proceeds thereof including, without limiting the generality of the foregoing, all “revenue” as defined in the Act and receipts from Rates and Charges and, except to the extent provided in the General Resolution, the proceeds of insurance and condemnation awards received with respect to, and proceeds from the sale or other disposition of any portion of, the System, and shall include, without limiting the foregoing, all interest and investment income or moneys held under the General Resolution which are deposited in the Revenue Fund, the Operating Fund or the Debt Service Fund, but not including the proceeds of any Special Subordinated Indebtedness or any Grant Receipts (except to the extent otherwise provided herein or in any other resolution of the Authority), any revenues, receipts or other moneys of a facility financed with repayments of principal of loans made from the Revolving Loan Fund, or any amounts permitted to be received and held outside of the various Funds and Accounts established by the General Resolution.

“Revenues Available for Bond Debt Service” shall mean, with respect to a twelve-month period, Net Revenues for such period plus (i) amounts transferred from the Rate Stabilization Fund to the Revenue Fund during such period; and (ii) amounts transferred from the Operating Reserve Fund to the Operating Fund in such period; provided, however, for purposes of calculating Revenues Available for Bond Debt Service, the sum of clause (i) and (ii) above shall not exceed the product of (x) the difference between the Primary Bond Coverage Ratio and 1.0, if any, and (y) the Required Debt Service Fund Deposits for all Outstanding Bonds for such period; and provided, further, that for purposes of calculating Revenues Available for Bond Debt Service the amount included pursuant to clause (i) above shall not exceed the product of (x) 0.1 and (y) the Required Debt Service Fund Deposits for all Outstanding Bonds for such period. Revenues deposited to the General Fund which are subsequently transferred to the Rate Stabilization Fund shall not be included in Revenues Available for Bond Debt Service in the year that such Revenues are deposited to the General Fund.

“Revenues Available for Subordinated Debt Service” shall mean with respect to a Fiscal Year, Revenues Available for Bond Debt Service less Required Debt Service Fund Deposits on all Series of Bonds Outstanding during such Fiscal Year.

“S&P” shall mean Standard & Poor’s Ratings Group.

“Secured Bond Coverage Ratio” shall mean 1.1 as adjusted from time to time pursuant to the General Resolution.

“Secured Bonds” or “Secured Indebtedness” shall mean all Bonds and all Subordinated Bonds.

“Secured Bond Coverage Requirement” shall mean, for any twelve-month period, the product of the Secured Bond Coverage Ratio and the sum of (i) the Required Debt Service Fund Deposits of all Outstanding Bonds for such period and (ii) the Required Subordinated Debt Service Fund Deposits for all Outstanding Parity Subordinated Bonds for such period.

“Series” or “Series of Secured Bonds” shall mean all of the Secured Bonds authenticated and delivered on original issuance identified pursuant to the Supplemental Resolution authorizing such Secured Bonds as a separate Series of Secured Bonds and any Secured Bonds thereafter authenticated and delivered in lieu of or in substitution therefor pursuant to the General Resolution regardless of variations in maturity, interest rate or other provisions.

“Sewer Operations” shall mean the “sewer division” established pursuant to Section 8(a) of the Act.

“Sinking Fund Installment” shall mean, as of any particular date of calculation, the amount required by the General Resolution or any Supplemental Resolution to be paid by the Authority on a future date for the retirement of the principal amount of Outstanding Bonds or Subordinated Bonds which are stated to mature subsequent to such

future date, but does not include any amount payable by the Authority by reason only of the maturity of a Bond or Subordinated Bond.

“Special Credit Facility” shall mean, with respect to any Series of Secured Bonds or portion thereof, a Credit Facility (a) which provides funds for (i) the direct payment of the Principal Installments of and interest on such Secured Bonds when due or (ii) the payment of the Principal Installments of and interest on such Secured Bonds in the event amounts otherwise pledged to the payment thereof are not available when due or (iii) the payment of the Tender Option Price of any Option Bond which may be tendered to the Authority for purchase or payment in accordance with the Supplemental Resolution authorizing such Option Bond (in any case, regardless of whether such Credit Facility provides funds for any other purpose) and (b) which (i) requires the Authority to directly reimburse the issuer of such Credit Facility for amounts paid thereunder and (ii) provides that such obligation is a Parity Reimbursement Obligation.

“Special Payment Obligations” shall mean payment obligations under any interest rate exchange, cap or other hedge agreement or other long-term contract which have been designated as payable from the Commonwealth Obligation Fund in such agreement.

“Special Subordinated Indebtedness” shall mean Indebtedness incurred in anticipation of grant receipts; incurred in anticipation of revenues; payable from and secured by the General Fund; incurred with respect to the financing of a separate facility; or incurred in connection with the Revolving Loan Fund, all in accordance with the provisions of the General Resolution.

“SRF Bonds” shall mean Water Pollution Abatement Obligations of the Authority.

“SRF Program Bonds” shall mean bonds of the Trust secured by SRF Bonds.

“Subordinated Bonds” shall mean bonds or indebtedness which have a lien subordinate to the lien of the Bonds, on the Funds and Accounts and property established under the General Resolution, and shall also mean any Subordinated Parity Bond Anticipation Notes and any Parity Reimbursement Obligation incurred with respect to Subordinated Bonds; provided that the Subordinated Bonds have no lien on the Debt Service Fund or the Debt Service Reserve Fund.

“Subordinated Debt Service Reserve Fund Requirement” shall mean the aggregate of the amounts, if any, required to be deposited in the Subordinated Debt Service Reserve Fund pursuant to all Supplemental Resolutions authorizing the issuance of Subordinated Bonds.

“Subordinated Parity Bond Anticipation Notes” shall mean Bond Anticipation Notes the interest on which is payable from and secured by a pledge of, and a lien on, the Revenues on a parity with the lien created by the General Resolution to secure the Subordinated Bonds.

“Supplemental Bond Coverage Requirement” for any Fiscal Year shall mean, unless the context otherwise indicates, the Required Debt Service Fund Deposits for all Bonds Outstanding as of the beginning of such Fiscal Year, times the Supplemental Bond Coverage Ratio.

“Supplemental Resolution” shall mean a resolution of the Authority authorizing the issuance of a Series of Bonds or Subordinated Bonds or otherwise amending or supplementing the General Resolution, adopted in accordance with the General Resolution.

“System” shall mean collectively the “Waterworks System” and the “Sewer System” as such terms are defined in Section 1(o) and 1(v) of the Act.

“Tax Exempt Indebtedness” shall mean Indebtedness the interest on which is excluded from gross income of the holder thereof for federal income tax purposes which was accompanied by a favorable Bond Counsel’s Opinion regarding such exclusion on the date of such Indebtedness.

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“Tender Option Price” shall mean, with respect to any Option Bond tendered for purpose or payment in accordance with the Supplemental Resolution authorizing such Option Bond, an amount equal to the principal amount of such Option Bond.

“Trust” shall mean the Massachusetts Clean Water Trust (formerly the Massachusetts Water Pollution Abatement Trust) first established pursuant to Chapter 275 of the Acts of 1989 of the Commonwealth.

“Trust Bond Resolution” shall mean a bond resolution of the Trust providing for the issuance of a series of SRF Program Bonds.

“Variable Rate Indebtedness” shall mean, as of any date of determination, any Indebtedness on which the interest rate borne thereby may vary during any part of its remaining term. For the purpose of calculating the applicable Series Debt Service Reserve Fund Requirement with respect to any Series of Variable Rate Indebtedness, the Adjusted Debt Service on such Series shall be determined by reference to the Pro Forma Bond Issue for such Series set forth in the Supplemental Resolution authorizing such Series.

“Water Pollution Abatement Obligations” shall mean obligations incurred and owing to the Trust.

“Watershed Division” shall mean the Division of Watershed Management established by Section 42 of Chapter 372 of the Acts of 1984 of the Commonwealth.

“Waterworks Operations” shall mean the “waterworks division” established pursuant to Section 8(a) of the Act.

The Pledge Effected by the General Resolution

(a) Under the General Resolution, there are pledged for the payment of the Bonds, in accordance with their terms and the provisions of the General Resolution, subject only to the provisions of the General Resolution permitting the application thereof for or to the purposes and on the terms and conditions therein set forth: (i) all Revenues; (ii) all moneys or securities in any of the Funds, Accounts and Subaccounts (except the Operating Fund, the Rebate Fund, the Note Payment Fund and the Subordinated Debt Service Reserve Fund) together with the investment earnings thereon except to the extent such earnings are required to be deposited in the Rebate Fund pursuant to a Supplemental Resolution, and (iii) all other moneys and securities to be received, held or set aside by the Authority or by any Fiduciary pursuant to the General Resolution.

(b) Subject only to the prior pledge created for the payment of the Bonds in paragraph (a) above, and on the terms and conditions set forth therein with respect to such prior pledge, the property described in clauses (i)-(iii) of said paragraph (a) (except moneys or securities in the Debt Service Fund and the Debt Service Reserve Fund) and the Subordinated Debt Service Reserve Fund are further pledged under the General Resolution to the payment of the Subordinated Bonds. (Section 501)

Additional Indebtedness

(a) Except for additional Indebtedness issued in accordance with the provisions of the General Resolution, the Authority shall not issue any bonds, notes or other evidences of indebtedness secured by a pledge of or other lien or charge on the Revenues and shall not create or cause to be created any lien or charge on such Revenues or on any amounts held by any Fiduciary under the General Resolution; but the Authority shall not be prevented from issuing bonds or notes or other obligations for the corporate purposes of the Authority payable out of, or secured by a pledge of, Revenues to be derived on and after the date that the pledge of the Revenues provided in the General Resolution shall be discharged and satisfied as provided in the General Resolution and which recite on their face that such pledge of said amounts is and shall be in all respects subordinate to the provisions of the General Resolution and the lien and pledge created by the General Resolution.

(b) Notwithstanding anything in the General Resolution to the contrary, so long as no default under the General Resolution shall have occurred and be continuing, the Authority may issue at any time or from time to time:

(i) Indebtedness issued in anticipation of Grant Receipts which may be secured solely by a pledge of the proceeds of such Indebtedness, the Grant Receipts anticipated, other amounts on deposit from time to time in any separate account established by the Authority to hold Grant Receipts, earnings thereon and other amounts not constituting Revenues under the General Resolution; or

(ii) Indebtedness issued in anticipation of the Revenues to be received in a particular Fiscal Year, whether unsecured or secured by a pledge of Revenues; provided that (a) any such Indebtedness shall be payable no later than one year from its date of issue (or, in the case of Indebtedness issued to renew any such Indebtedness, no later than one year from the date of issue of the original issue of Indebtedness), (b) the aggregate amount of such Indebtedness Outstanding at any one time in a Fiscal Year shall not exceed fifty percent (50%) of the Revenues for the immediately preceding Fiscal Year and (c) the proceeds of such Indebtedness (other than the proceeds of Indebtedness issued to pay a prior issue of such Indebtedness) shall be deposited in the Revenue Fund; or

(iii) Indebtedness payable from and secured by amounts on deposit in or to be deposited in the General Fund pursuant to the General Resolution.

Any Indebtedness described in this paragraph (b), in addition to the security therefor described herein, may be issued as general obligations of the Authority or as special obligations payable solely from the Revenues, Grant Receipts, proceeds, moneys, securities or funds pledged as security therefor.

(c) Notwithstanding anything in the General Resolution to the contrary, the Authority may issue Indebtedness secured solely by the revenues, receipts or other moneys derived by the Authority from the lease, license, operation, sale or other disposition of any facility or equipment (whether or not part of the System) hereafter constructed or acquired by or on behalf of the Authority with the proceeds of such Indebtedness. Such Indebtedness shall be special, limited obligations of the Authority payable solely out of the revenues, receipts and other moneys pledged therefor. Such revenues, receipts and other moneys shall not be considered Revenues hereunder provided that (i) neither the debt service on such Indebtedness nor any cost of the acquisition, construction, operation, maintenance or repair of any such facility or equipment nor provision for reserves for any of the foregoing shall be paid from the proceeds of Secured Indebtedness or from Revenues (other than Revenues deposited in or available for deposit in the General Fund pursuant to the General Resolution) or shall be included in Operating Expenses, (ii) any such revenues, receipts and moneys in excess of such debt service, cost of acquisition, construction, operation, maintenance and repair and reserves shall be deposited in the Revenue Fund (and upon such deposit shall be deemed Revenues), and (iii) prior to the issue of any such Indebtedness, the Authority shall deliver to the Trustee a certificate of the Consulting Engineer certifying that the lease, license, operation, sale or other disposition of such facility or equipment and the application of the revenues, receipts and other moneys derived therefrom to the operation, maintenance and repair thereof and the payment of the debt service on the Indebtedness issued therefor and the provision of reserves for the foregoing, will not result in any decrease in the Revenues projected by such Consulting Engineer to be received by the Authority during the succeeding five Fiscal Years (including the Fiscal Year in which such Indebtedness is issued).

(d) Notwithstanding anything in the General Resolution to the contrary, the Authority may issue Indebtedness secured by a pledge of moneys in the Revolving Loan Fund which either (i) have been committed to loans to Local Bodies or (ii) represent payments made by Local Bodies on loans previously made from the Revolving Loan Fund, or by a pledge of moneys in the General Fund. Any lien granted on such moneys in the Revolving Loan Fund to secure such Indebtedness shall be senior to the pledge of the General Resolution but any lien granted on moneys in the General Fund to secure such Indebtedness shall be junior to such pledge. Any such Indebtedness shall be issued pursuant to a separate resolution of the Authority and each instrument evidencing such Indebtedness shall state expressly that the holders of such Indebtedness shall have no rights to the Revenues or other moneys held in Funds and Accounts established under the General Resolution except for moneys in the Revolving Loan Fund or in the General Fund as described in this paragraph. (Section 709)

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Conditions Precedent to Delivery of a Series of Bonds

The Bonds of a Series shall be executed by the Authority for issuance and delivered to the Trustee and thereupon shall be authenticated by the Trustee and delivered to the Authority or upon its order, but only upon the receipt by the Trustee of certain documents and opinions relating to such Bonds and:

(a) except in the case of any Series of Refunding Secured Bonds issued in the manner described in clause (i) under the heading Conditions Precedent to Delivery of Refunding Secured Bonds or any Parity Bond Anticipation Notes,

(i) a Certificate of an Authorized Representative of the Authority certifying that for the most recent period of twelve consecutive months preceding the date on which such Bonds are to be issued for which such information is available, Revenues Available for Bond Debt Service were at least equal to the Primary Bond Coverage Requirement provided that for any Series of Bonds issued on or prior to June 30, 1990 the requirement of this section (a)(i) shall be deemed satisfied; and

(ii) either

(A) a Certificate of the Consulting Engineer certifying that for both the Fiscal Year in which such Bonds are to be issued and the Fiscal Year immediately following, projected Revenues Available for Bond Debt Service, assuming transfers from the Rate Stabilization Fund only to the extent such assumption is set forth in a Certificate of the Authority, are at least equal to the Primary Bond Coverage Requirement for all Series of Bonds Outstanding in such Fiscal Year, taking into account the Series of Bonds to be issued and any other Series of Bonds which is projected to be issued on or before the last day of such Fiscal Year; or

(B) a certificate of the Consulting Engineer certifying that

(1) for the Fiscal year in which such Bonds are to be issued, projected Revenues Available for Bond Debt Service, calculated without assuming any increase in Rates and Charges other than those then approved in accordance with the General Resolution, and assuming transfers from the Rate Stabilization Fund only to the extent such assumption is set forth in a Certificate of the Authority, are at least equal to the sum of (x) the Required Debt Service Fund Deposits for all Series of Bonds then Outstanding in such Fiscal Year, taking into account the particular Series of Bonds to be issued, and (y) any amounts required to be deposited in the Operating Reserve Fund, the Insurance Reserve Fund or the Renewal and Replacement Reserve Fund to satisfy the applicable Requirement for such Fund, taking into account the particular Series of Bonds to be issued; and

(2) for the Fiscal Year immediately following the Fiscal Year in which such Bonds are to be issued, projected Revenues Available for Bond Debt Service as calculated for Section (ii)(B)(1), but adjusted to reflect any increases in Operating Expenses shown on the Authority's proposed or final Operating Budget for such following Fiscal Year or, if such Budget has not been submitted, as adjusted to reflect an increase in Operating Expenses over the previous three Fiscal Years, are at least equal to the sum of (x) the Required Debt Service Fund Deposits on all Series of Bonds included for purposes of (ii)(B)(1)(x) above and (y) only if such Operating Budget has been adopted, any amounts required to be deposited in the Operating Reserve Fund to satisfy the Operating Reserve Fund Requirement in such Fiscal Year.

(b) a Certificate of the Authorized Representative of the Authority, dated as of the date of such delivery, stating that there is no Event of Default by the Authority with respect to the performance of any of the covenants, conditions, agreements or provisions contained in the General Resolution provided, however that the Authority need deliver no such certification with respect to compliance with covenants as to Rates and Charges for a Series of Refunding Secured Bonds issued pursuant to the General Resolution; and

(c) such further documents and moneys as are required by the General Resolution or any Supplemental Resolution. (Section 206)

Conditions Precedent to Delivery of a Series of Secured Bonds Senior to or on Parity with Subordinated Bonds.

(a) The Subordinated Bonds of a Series shall be executed by the Authority for issuance and delivery to the Trustee and thereupon shall be authenticated by the Trustee and delivered to the Authority or upon its order, but only upon the receipt by the Trustee of the items, opinions and certificates described in the provisions under the heading Conditions Precedent to Delivery of a Series of Bonds (except for the requirements of paragraph (a) thereof), restated as appropriate for the issuance of Subordinated Bonds and any items, opinions or certificates required by the Supplemental Resolution authorizing such Subordinated Bonds.

(b) In addition, so long as any Parity Subordinated Bonds are outstanding, then Secured Bonds which are paid on a parity with or senior to the Parity Subordinated Bonds may be issued by the Authority only if there shall have been delivered to the Trustee in addition to any documents required by paragraph (a) above:

(i) a Certificate of a Consulting Engineer of the Authority certifying that for the most recent period of twelve consecutive months preceding the date on which such parity or senior Secured Bonds are to be issued for which such information is available, Revenues Available for Bond Debt Service were at least equal to the Secured Bond Coverage Requirement; and

(ii) either (A) a Certificate of a Consulting Engineer of the Authority certifying that for both the Fiscal Year in which such parity or senior Secured Bonds are to be issued and the Fiscal Year immediately following, projected Revenues Available for Bond Debt Service, assuming transfers from the Rate Stabilization Fund only to the extent such assumption is set forth in a Certificate of the Authority, are at least equal to the Secured Bond Coverage Requirement for all Series of Bonds and Parity Subordinated Bonds Outstanding in such Fiscal Year, taking into account the Series of parity or senior Secured Bonds to be issued and any other Series of parity or senior Secured Bonds which is projected to be issued on or before the last day of such Fiscal Year; or (B) a Certificate of an Authorized Representative of the Authority certifying that

(1) for the Fiscal Year in which such parity or senior Secured Bonds are to be issued, projected Revenues Available for Bond Debt Service, calculated without assuming any increase in Rates and Charges other than those then approved in accordance with the General Resolution, and assuming transfers from the Rate Stabilization Fund only to the extent such assumption is set forth in a Certificate of the Authority, are at least equal to the sum of (x) the Required Debt Service Fund Deposits and Required Subordinated Debt Service Fund Deposits for all Series of Bonds and Parity Subordinated Bonds then Outstanding in such Fiscal Year, taking into account the particular Series of parity or senior Secured Bonds to be issued, and (y) any amounts required to be deposited in the Operating Reserve Fund, the Insurance Reserve Fund or the Renewal and Replacement Reserve Fund to satisfy the Requirement for such Fund, taking into account the particular Series of parity or senior Secured Bonds to be issued; and

(2) for the Fiscal Year immediately following the Fiscal Year in which such parity or senior Secured Bonds are to be issued, projected Revenues Available for Bond Debt Service as calculated for (b)(ii)(B)(1) above, but adjusted to reflect any increases in Operating Expenses shown on the Authority's proposed or final Operating Budget for such following Fiscal Year or, if such Budget has not been submitted as adjusted to reflect an increase in Operating Expenses not less than the average percentage increase in Operating Expenses over the previous three Fiscal Years, are at least equal to the sum of (x) the Required Debt Service Fund Deposits and the Required Subordinated Debt Service Fund Deposits on the Series of Bonds and Parity Subordinated Bonds included for purposes of (b)(ii)(B)(1) above and (y) any amounts required to be deposited in the Operating Reserve Fund to satisfy the applicable Requirement for such Fund in such Fiscal Year. (Section 206A)

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Conditions Precedent to Delivery of Refunding Secured Bonds

One or more Series of Refunding Secured Bonds may be issued pursuant to the General Resolution at any time to refund any Outstanding Secured Bonds provided that (i) with respect to Bonds issued to refund Bonds, (A) Aggregate Adjusted Debt Service on the Bonds immediately after the issuance of such Refunding Secured Bonds for each Fiscal Year shall be no greater than Aggregate Adjusted Debt Service on all Bonds immediately prior to the issuance of such Refunding Secured Bonds and (B) the final maturity of all Bonds Outstanding immediately after the issuance of such Refunding Secured Bonds shall be no later than the final maturity of all Bonds Outstanding immediately prior to the issuance of such Refunding Secured Bonds, (ii) with respect to Parity Subordinated Bonds issued to refund Parity Subordinated Bonds, (A) Aggregate Adjusted Debt Service on all Parity Subordinated Bonds immediately after the issuance of such Refunding Secured Bonds for each Fiscal Year shall be no greater than Aggregate Adjusted Debt Service on all Parity Subordinated Bonds Outstanding immediately prior to the issuance of such Refunding Secured Bonds and (B) the final maturity of all Parity Subordinated Bonds Outstanding immediately after the issuance of such Refunding Secured Bonds shall be no later than the final maturity immediately prior to the issuance of such Refunding Secured Bonds, or (iii) the requirements detailed in subparagraph (a) under the heading Conditions Precedent to Delivery of a Series of Bonds in the case of an issue of additional Bonds, or the requirements detailed in subparagraph (b) under the heading Conditions Precedent to Delivery of a Series of Secured Bonds Senior to or on Parity with Subordinated Bonds in the case of an issue of additional Parity Subordinated Bonds, shall have been satisfied after giving effect to the proposed refunding, all as shown in a Certificate signed by an Authorized Representative of the Authority (and, as to certain matters, a Certificate signed by the Consulting Engineer) and delivered to the Trustee prior to the authentication and delivery of such Series of Refunding Secured Bonds. Refunding Secured Bonds shall be issued in a principal amount sufficient, together with other moneys available therefor, to accomplish such refunding and to make the deposits in the Funds, Accounts and Subaccounts required by the provisions of the Supplemental Resolution authorizing such Secured Bonds.

Express Reservation of Rights

The Authority expressly reserves the right to issue Subordinated Bonds payable from the Subordinated Debt Service Fund prior to, on a parity with or junior to the SRF Bonds, to establish one or more covenants for the sole benefit of some or all of such additional Subordinated Bonds, and to fund one or more accounts within the Subordinated Debt Service Reserve Fund for the sole benefit of some or all of such Subordinated Bonds. (Sixth Supplemental Resolution Section 309)

Bond Anticipation Notes

Whenever the Authority shall authorize the issuance of a Series of Secured Bonds, the Authority may, by resolution, authorize the issuance of notes (and renewals thereof) in anticipation of such Secured Bonds. The principal of and interest on such notes and renewals thereof shall be payable from the proceeds of such notes or from the proceeds of the sale of the Series of Secured Bonds in anticipation of which such notes are issued. The proceeds of such Secured Bonds may be pledged for the payment of the principal of and interest on such notes and any such pledge shall have a priority over any other pledge of such proceeds created by the General Resolution. The Authority may pledge the Revenues to the payment of the interest on such notes which pledge may be on a parity with the pledge securing all Bonds in which event such interest shall be payable from the Debt Service Fund. The Authority may also pledge the Revenues and moneys on deposit in the General Fund and the Rate Stabilization Fund to the payment of the principal of such notes but such pledge shall be subordinate to the pledge securing the payment of the Secured Bonds. (Section 208)

Special Subordinated Indebtedness

The Authority may, at any time, or from time to time, issue Special Subordinated Indebtedness payable out of, and which may be secured by a pledge of and lien on such amounts in such Funds as may from time to time be available for the purpose of payment thereof as provided in the General Resolution. Any pledge of or lien on amounts held by the Trustee shall be, and shall be expressed to be subordinate in all respects to the pledge created by the General Resolution as security for the Secured Bonds. Such Special Subordinated Indebtedness shall be issued only as follows:

(a) Notwithstanding anything in the General Resolution to the contrary, so long as no default shall have occurred under the General Resolution and be continuing, the Authority may issue at any time or from time to time:

(i) Indebtedness issued in anticipation of Grant Receipts secured solely by a pledge of the proceeds of such Indebtedness, Grant Receipts including the Grant Receipts anticipated, earnings thereon and other amounts not constituting Revenues under the General Resolution; or

(ii) Indebtedness issued in anticipation of the Revenues to be received in a particular Fiscal Year, whether unsecured or secured by a pledge of Revenues; provided that (a) any such Indebtedness shall be payable no later than one year from its date of issue (or, in the case of Indebtedness issued to renew any such Indebtedness, no later than one year from the date of issue of the original issue of Indebtedness), (b) the aggregate principal amount of such Indebtedness Outstanding at any one time in a Fiscal Year shall not exceed fifty percent (50%) of the Revenues for the immediately preceding Fiscal Year and (c) the proceeds of such Indebtedness (other than the proceeds of Indebtedness issued to pay a prior issue of such Indebtedness) shall be deposited in the Revenue Fund; or

(iii) Indebtedness payable from and secured by amounts on deposit in or to be deposited in the General Fund pursuant to the General Resolution.

Any Indebtedness described in this paragraph (a), in addition to the security therefor described or provided for herein, may be issued as general obligations of the Authority or as special obligations payable solely from the Revenues, Grant Receipts, proceeds, moneys, securities or funds pledged as security therefor.

(b) Notwithstanding anything in the General Resolution to the contrary, the Authority may issue Indebtedness secured solely by the revenues derived by the Authority from any facility or equipment (whether or not part of the System) hereafter constructed or acquired by or on behalf of the Authority with the proceeds of such Indebtedness. Such Indebtedness shall be special, limited obligations of the Authority payable solely out of the revenues pledged therefor. Such revenues, receipts and other moneys shall not be considered Revenues under the General Resolution provided that (i) neither the debt service on such Indebtedness nor any cost of any such facility or equipment nor provision for reserves for any of the foregoing shall be paid from the proceeds of Secured Indebtedness or from Revenues (other than Revenues deposited in or available for deposit in the General Fund pursuant to the General Resolution) or shall be included in Operating Expenses, (ii) any such revenues in excess of such debt service, cost of acquisition, construction, operation, maintenance and repair and reserves shall be deposited in the Revenue Fund (and upon such deposit shall be deemed Revenues), and (iii) prior to the issue of any such Indebtedness, the Authority shall deliver to the Trustee a Certificate of the Consulting Engineer certifying that the operation, of such facility or equipment and the application of the revenues derived therefrom to the operation, maintenance and repair thereof and the payment of the debt service on the Indebtedness issued therefor and the provision of reserves for the foregoing, will not result in any decrease in the Revenues projected by such Consulting Engineer to be received by the Authority during the succeeding five Fiscal Years (including the Fiscal Year in which such Indebtedness is issued).

(c) Notwithstanding anything in the General Resolution to the contrary, the Authority may issue Indebtedness secured by a pledge or certain moneys in the Revolving Loan Fund or by moneys in the General Fund. Any lien granted on such moneys in the Revolving Loan Fund to secure such Indebtedness shall be senior to the pledge of the General Resolution but any lien granted on moneys in the General Fund to secure such Indebtedness shall be junior to such pledge. (Sections 209 and 709)

Credit Facilities

(a) In connection with the issuance of any Series of Secured Bonds under the General Resolution, the Authority may obtain or cause to be obtained one or more Credit Facilities providing for payment of all or a portion of the Debt Service or to become due on such Secured Bonds, providing for the purchase of such Secured Bonds by the issuer of such Credit Facility or providing funds for the purchase of such Secured Bonds by the Authority.

(b) The Authority may also in an agreement with the issuer of such Credit Facility agree to directly reimburse such issuer for amounts paid under the terms of such Credit Facility, together with interest thereon (the

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“Reimbursement Obligation”); provided, however, that no Reimbursement Obligation shall be deemed to be Outstanding for the purposes of the General Resolution until amounts are paid under such Credit Facility. Any such Reimbursement Obligation may be secured by a pledge of, and a lien on, Revenues on a parity with the lien created by the General Resolution (a “Parity Reimbursement Obligation”). Any such Parity Reimbursement Obligation shall be deemed to be a Secured Bond. (Section 210)

Establishment of Funds and Accounts

- (a) The following Funds and Accounts are established by the General Resolution:
 - (i) Construction Fund, containing a:
 - (A) Waterworks System Account; and
 - (B) Sewer System Account;
 - (ii) Cost of Issuance Fund;
 - (iii) Revenue Fund;
 - (iv) Operating Fund;
 - (v) Debt Service Fund, containing a:
 - (A) Principal Account;
 - (B) Interest Account;
 - (C) Redemption Account; and
 - (D) Capitalized Interest Account;
 - (vi) Subordinated Debt Service Fund, containing a:
 - (A) Principal Account;
 - (B) Interest Account;
 - (C) Redemption Account; and
 - (D) Capitalized Interest Account;
 - (vii) Debt Service Fund containing a Common Account;
 - (viii) Subordinated Debt Service Reserve Fund containing a Common Account;
 - (ix) [Reserved]
 - (x) Commonwealth Obligation Fund;
 - (xi) Rebate Fund;
 - (xii) Operating Reserve Fund;
 - (xiii) Insurance Reserve Fund;
 - (xiv) Renewal and Replacement Reserve Fund;
 - (xv) Water Pollution Abatement Fund;
 - (xvi) Rate Stabilization Fund;
 - (xvii) Revolving Loan Fund;
 - (xviii) General Fund; and
 - (xix) Note Payment Fund.

(b) Any Supplemental Resolution which provides for a Special Credit Facility may establish one or more “Special Accounts” in the Debt Service Reserve Fund or the Subordinated Debt Service Reserve Fund. Unless otherwise expressly provided in the General Resolution, all of the Funds, Accounts and Subaccounts shall be held by the Trustee, except the Operating Fund and the Construction Fund or any Accounts or Subaccounts therein, which may be held by one or more Depositories. (Section 502)

Construction Fund

There shall be deposited from time to time in the Subaccounts of the Construction Fund (i) the proceeds of casualty insurance, contractors’ performance bonds and any condemnation, as determined by the Authority in accordance with the General Resolution; (ii) the balance remaining of the proceeds of any Bond Anticipation Notes issued to pay the Costs of a Project after payment or provision for payment of such notes; (iii) any amounts required to be deposited therein pursuant to the General Resolution or any Supplemental Resolution; (iv) any moneys transferred pursuant to the General Resolution from the Rate Stabilization Fund or from the General Fund; and (v) any other amounts received by the Authority for or in connection with the Waterworks System and the Sewer System, respectively, and determined by the Authority to be deposited therein, which are not otherwise required to be applied

by the General Resolution. Except as otherwise provided under the heading Priority of Funds in Event of Debt Service Fund Shortfall or Priority of Funds in Event of Subordinated Debt Service Fund Shortfall or if investment earnings on moneys in the Construction Fund are required to be transferred to the Rebate Fund, amounts in the Construction Fund shall be expended only to pay Costs of a Project pursuant to requisitions filed in accordance with the Supplemental Resolution. At any time from time to time the Trustee may transfer amounts on deposit therein between a particular Subaccount within the Waterworks System Account and the corresponding Subaccount within the Sewer System Account upon receipt of a Certificate of an authorized Representative of the Authority requesting such transfer. If the Authority at any time cannot certify that it reasonably expects the moneys on deposit in any Subaccount of the Construction Funds which constitutes the proceeds of Tax Exempt Indebtedness to be expended for the Costs of a Project, then such shall be transferred to the Redemption Account and applied solely to the redemption of Secured Bonds of the applicable Series on the first date on which such Secured Bonds may be called without premium (unless the Authority shall elect to call such Secured Bonds earlier at a premium). (Section 503)

Cost of Issuance Fund

There shall be deposited from time to time in a separate Subaccount of the Cost of Issuance Fund for each Series of Secured Bonds issued under the General Resolution any amounts required to be deposited therein pursuant to the terms of a Supplemental Resolution with respect to such Series. Moneys in the Cost of Issuance Fund shall be paid upon the filing by the Authority with the Trustee its requisition therefor (in the form set forth in a Supplemental Resolution) signed by an Authorized Representative of the Authority. (Section 504)

Deposits of Revenues

The Authority shall promptly cause all Revenues received to be deposited in the Revenue Fund held by the Trustee. There shall also be deposited into the Revenue Fund by the Trustee or any other Fiduciary all other amounts required by the General Resolution to be so deposited. (Section 505)

Flow of Funds from the Revenue Fund

(a) On the last Business Day of each month the Trustee shall, after making any transfers that are required by the General Resolution, from the amounts on deposit in the Revenue Fund, make the following deposits in the following order:

(i) To the Operating Fund, the amount necessary to make the amount on deposit therein equal to Operating Expenses for the next succeeding three months, as shown on the Operating Budget.

(ii) To the Debt Service Fund:

(A) on a pro rata basis the amount necessary to make up any deficiency in any Subaccount resulting from an increase in the applicable interest rate on any Variable Rate Bonds over the rate which was assumed in calculating the amount required for a prior deposit pursuant to the General Resolution;

(B) on a pro rata basis to each Subaccount of the Interest Account, after taking into account any available moneys in the corresponding Subaccount of the Capitalized Interest Account if any, the amount necessary to increase the amount on deposit in each such Subaccount so that it equals interest included in Adjusted Debt Service next coming due on Outstanding Bonds of the applicable Series accrued and unpaid and to accrue to and including the last day of the next succeeding month (assuming, in the case of Variable Rate Bonds, no further adjustments in the applicable interest rate);

(C) on a pro rata basis to each Subaccount of the Principal Account the amount necessary to increase the amount on deposit in each such Subaccount so that it equals that portion of the Principal Installment included in Adjusted Debt Service next coming due on Outstanding Bonds of the applicable Series accrued and unpaid and to accrue (assuming such Principal

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Installment accrues on the same basis as simple interest on a debt) to and including the last day of the next succeeding month; provided, however, that no deposit shall be required to be made with respect to a Bond prior to twelve months before the next Principal Installment coming due on such Bond; and

(D) on a pro rata basis to each Subaccount of the Redemption Account the amount, if any, necessary to increase the amount on deposit in each Subaccount so that it equals the Redemption Price of Outstanding Bonds of the applicable Series then called for redemption (other than from Sinking fund Installments) as of any date on or prior to last day of the next succeeding month, after taking into account amounts on deposit in the applicable Subaccount within the Principal Account, if any, available to pay such Bonds called for redemption.

(E) on a pro rata basis to each Subaccount of the Interest Account established with respect to Regularly Scheduled Qualified Swap Payments relating to a Series of Designated Debt consisting of Bonds, the amount (if any) necessary to increase the amount on deposit in each such Subaccount so that it equals that portion of the Regularly Scheduled Qualified Swap Payment next coming due with respect to such Series of Designated Debt accrued and unpaid and to accrue (assuming such Regularly Scheduled Qualified Swap Payment accrues on the same basis as simple interest on a debt) to and including the last day of the next succeeding month.

The Trustee shall not be required to make any payments into the Debt Service Fund when the aggregate amount of money in the Debt Service Fund and the Debt Service Reserve Fund is at least equal to the amount required to defease the lien of the General Resolution granted to secure payment of Bonds pursuant to the provisions of the General Resolution described under the heading Defeasance.

(iii) To the Subordinated Debt Service Fund deposits determined with respect to Subordinated Bonds in the same manner as the deposits set forth in clause (ii) above with respect to Bonds; provided, that there also shall be paid on a pro rata basis to each Subaccount of the Interest Account established with respect to Regularly Scheduled Qualified Swap Payments relating to a Series of Designated Debt, the amount (if any) necessary to increase the amount on deposit in each such Subaccount so that it equals that portion of the Regularly Scheduled Qualified Swap Payment next coming due with respect to such Series of Designated Debt accrued and unpaid and to accrue (assuming such Regularly Scheduled Qualified Swap Payment accrues on the same basis as simple interest on a debt) to and including the last day of the next succeeding month.

The Trustee shall not be required to make any payments into the Subordinated Debt Service Fund when the aggregate amount of money in the Debt Service Fund and the Debt Service Reserve Fund is at least equal to the amount required to defease the lien of the General Resolution granted to secure payment of Bonds and when the aggregate amount of money in the Subordinated Debt Service Fund and the Subordinated Debt Service Reserve Fund is at least equal to the amount required to defease the lien of the General Resolution granted to secure payment of Subordinated Bonds, all pursuant to the provisions of the General Resolution described under the heading Defeasance.

(iv) To the Debt Service Reserve Fund,

(A) to the Common Account therein one-twelfth (1/12) the amount, if any, necessary to increase the amount on deposit in such Account, determined as of the first day of the Fiscal Year, to an amount equal to the Debt Service Reserve Fund Requirement (provided that no such deposit shall be required in a Fiscal Year following the funding of the Common Account in connection with the issuance of a Series of Bonds pursuant to the General Resolution); and

(B) to each such Special Account the deposit required by any Supplemental Resolution.

(v) To the Subordinated Debt Service Reserve Fund,
 (A) to each Series Subaccount of the Common Account therein the amount, if any, necessary to increase the amount on deposit in such Subaccount to the level required by any Supplemental Resolution;

(B) to each Special Account the deposit required by any Supplemental Resolution.

(vi) [Reserved].

(vii) To the Commonwealth Obligation Fund, the amount equal to the amount of Commonwealth Obligations (including, without limitation, Special Payment Obligations) payable during the next succeeding month, as shown on the Operating Budget.

(viii) To the Rebate Fund, the amount of the Rebate Fund Requirement, if any, determined in accordance with the Supplemental Resolution.

(b) On each December 31 and June 30, or, if such days are not Business Days, on the next preceding Business Day, the Trustee shall, from the amounts on deposit in the Revenue Fund, and after making the deposits referred to in paragraph (a) above, make the following deposits in the following order:

(i) To the Operating Reserve Fund, one half of the difference between the amount on deposit in such Fund on the first day of the current Fiscal Year and the Operating Reserve Fund Requirement for the current Fiscal Year.

(ii) To the Insurance Reserve Fund, one half of the difference between the amount on deposit in such Fund on the first day of the current Fiscal Year and the Insurance Reserve Fund Requirement for the current Fiscal Year.

(iii) To the Renewal and Replacement Reserve Fund, one half of the difference between the amount on deposit in such Fund on the first day of the current Fiscal Year and Renewal and Replacement Reserve Requirement for the current Fiscal Year.

(iv) To the Water Pollution Abatement Fund, the amount necessary to increase the amount on deposit therein so that it equals the amount of Water Pollution Abatement Obligations payable during the next six months, as certified by an Authorized Representative of the Authority.

(v) To the Revolving Loan Fund, such amount as the Authority may from time to time determine.

(vi) Subject to the provisions of paragraph (c) below, the General Fund, any moneys remaining after making the deposits set forth above.

(c) On any June 30 and December 31 on which deposits are to be made pursuant to (b) above, after making the deposits required by clauses (i)-(v) of paragraph (b) above, the Trustee, on direction of an Authorized Representative, shall retain all or portion of the remaining moneys in the Revenue Fund to provide additional moneys for deposits required under paragraph (a) above during the next six months. (Section 506)

Operating Fund

The Operating Fund shall be established as one or more accounts with one or more banks or trust companies, as the Authority shall determine, which shall be Depositaries. Moneys held in the Operating Fund shall be applied by the Authority to the payment of Operating Expenses in accordance with the Operating Budget. Moneys in the Revenue Fund and the Operating Reserve Fund shall be paid by the Trustee to the Authority for deposit into the Operating Fund pursuant to the General Resolution. If on any June 30, or, if such day is not a Business Day, on the next preceding

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Business Day, the amount on deposit in the Operating Fund exceeds the amount equal to the next three months of Operating Expenses as shown on the Authority's Operating Budget then such excess shall be transferred to the Revenue Fund. (Section 507)

Debt Service Fund

(a) The Trustee shall, for each Series of Bonds Outstanding, pay (i) on each Bond Payment Date, from the moneys on deposit in the applicable Subaccounts within the Principal Account and Interest Account of the Debt Service Fund the amounts required for the payment of the Principal Installments and for the payment of interest, respectively, due on such Date; (ii) on any redemption date other than for sinking fund redemption, from the applicable Subaccounts within the Interest Account and Redemption Account of the Debt Service Fund the amounts required for the payment of accrued interest and for the payment of principal of and premium, if any, respectively, on Bonds to be redeemed; and (iii) on any date of purchase, from the applicable Subaccounts within the Principal Account and of the Debt Service Fund, the amounts required for the payment of principal and interest, respectively, of any Bonds to be purchased to the extent sufficient amounts are not available therefor under a Credit Facility in accordance with the applicable Supplemental Resolution.

(b) The amounts accumulated in the applicable Subaccount within the Principal Account of the Debt Service Fund for each Sinking Fund Installment shall, at the direction of an Authorized Representative of the Authority, be applied (together with amounts in the applicable Subaccount within the Interest Account of the Debt Service Fund with respect to interest on the Bonds for which such Sinking Fund Installment was established) by the Trustee at the written direction of the Authority prior to the forty-fifth day preceding the due date of such Sinking Fund Installment as follows:

(1) to the purchase of Bonds of the Series and maturity for which such Sinking Fund Installment was established, at prices (including any brokerage and other charges) not exceeding the Redemption Price payable for such Bonds when such Bonds are redeemable by application of such Sinking Fund Installment plus unpaid interest accrued to the date of purchase; or

(2) to the redemption of such Bonds, if then redeemable by their terms, at or below the Redemption Price referred to in clause (1) above;

provided, however, that the Trustee shall not call for redemption or purchase any Bonds pursuant to this paragraph (b) which have already been called for redemption pursuant to the provisions of the General Resolution.

(c) Upon the purchase or redemption of any Bond pursuant to paragraph (b) above, an amount equal to the principal amount of the Bond so purchased or redeemed shall be credited toward the next Sinking Fund Installment thereafter to become due and the amount of any excess of the amounts so credited over the amount of such Sinking Fund Installment shall be credited against future Sinking Fund Installments in direct chronological order.

(d) As soon as practicable after the forty-fifth day preceding the due date of any such Sinking Fund Installment, the Trustee shall proceed to call for redemption, pursuant to the General Resolution, on such due date Bonds of the Series and maturity for which such Sinking Fund Installment was established in the amount of such Sinking Fund Installment. The Trustee shall so call such Bonds for redemption whether or not it then has moneys in the Debt Service Fund sufficient to pay the applicable Redemption Price thereof on the redemption date. (Section 508)

Priority of Funds in Event of Debt Service Fund Shortfall

If on any Bond Payment Date there shall be insufficient monies available in the applicable Subaccount within the applicable Account in the Debt Service Fund to provide for payment of the Principal Installments of or interest on any Series of Bonds then due, after drawing any moneys available for such purpose from any applicable Credit Facility or Special Account in the Debt Service Reserve Fund, the Trustee shall withdraw and apply the necessary moneys to provide for such insufficiency from the following Funds and Accounts in the following order: (i) amounts in the Redemption Account not yet committed to the redemption of Bonds, (ii) the General Fund, (iii) amounts in the

Revolving Loan Fund not yet committed to loans to Local Bodies, (iv) the Rate Stabilization Fund, (v) the Water Pollution Abatement Fund, (vi) the Renewal and Replacement Reserve Fund, (vii) the Insurance Reserve Fund, (viii) the Operating Reserve Fund, (ix) the Commonwealth Obligation Fund, (x) [Reserved], (xi) [Reserved], (xii) the Common Account in the Debt Service Reserve Fund, (xiii) the Subordinated Debt Service Fund, (xiv) the Cost of Issuance Fund and (xv) the Construction Fund. (Section 508(e))

In connection with the issuance or maintenance of any Designated Debt consisting of Bonds, the Authority may establish within the Interest Account of the Debt Service Fund one or more Subaccounts for the purpose of holding funds to be applied to the payment of Regularly Scheduled Qualified Swap Payments relating to such Designated Debt. Such moneys shall be applied by the Trustee, at the direction of the Authority, to the payment of such Regularly Scheduled Qualified Swap Payments. (Section 508(f))

Subordinated Debt Service Fund

(a) The Trustee shall, for each Series of Subordinated Bonds Outstanding, make payments similar to those set forth with respect to Bonds under the heading Debt Service Fund. The Trustee shall also apply moneys in the Subordinated Debt Service Fund as set forth under the heading Priority of Funds in Event of Debt Service Fund Shortfall. Moneys in the Subordinated Debt Service Fund shall also be transferred to the Note Payment Fund and applied to the payment of interest on notes issued pursuant to the terms described under the heading Bond Anticipation Notes to the extent provided in any Supplemental Resolution authorizing such notes.

(b) The amounts accumulated in the applicable Subaccount within the Principal Account of the Subordinated Debt Service Fund for each Sinking Fund Installment may be applied (together with amounts in the applicable Subaccount within the Interest Account of the Subordinated Debt Service Fund with respect to interest on the Subordinated Bonds for which such Sinking Fund was established) by the Trustee to the purchase or redemption of Subordinated Bonds of the Series and maturity for which such Sinking Fund Installment was established in the same manner as moneys in the Debt Service Fund may be applied to Bonds as set forth in paragraph (b) under the heading Debt Service Fund. Upon such purchase or redemption, an amount equal to the principal amount of the Subordinated Bond so purchased or redeemed shall be credited toward the next Sinking Fund Installment thereafter to become due and the amount of any excess of the amounts so credited over the amount of such Sinking Fund Installment shall be credited against future Sinking Fund Installments in direct chronological order.

(c) As soon as practicable after the forty-fifth day preceding the due date of any such Sinking Fund Installment, the Trustee shall proceed to call for redemption on such due date Subordinated Bonds of the Series and maturity for which such Sinking Fund Installment was established in the amount of such Sinking Fund Installment. The Trustee shall so call such Subordinated Bonds for redemption whether or not it then has moneys in the Subordinated Debt Service Fund sufficient to pay the applicable Redemption Price thereof on the redemption date.

(d) In connection with the issuance or maintenance of any Designated Debt, the Authority may establish within the Interest Account of the Subordinated Debt Service Fund one or more Subaccounts for the purpose of holding funds to be applied to the payment of Regularly Scheduled Qualified Swap Payments relating to such Designated Debt. Such moneys shall be applied by the Trustee, at the direction of the Authority, to the payment of such Regularly Scheduled Qualified Swap Payments. (Section 509)

Priority of Funds in Event of Subordinated Debt Service Fund Shortfall

If on any Subordinated Bond Payment Date there shall be insufficient moneys available in the applicable Subaccount within the applicable Account in the Subordinated Debt Service Fund to provide for payment of the Principal Installments of or interest on any Series of Subordinated Bonds then due, after drawing any moneys available for such purpose from any applicable Credit Facility or Special Account in the Subordinated Debt Service Reserve Fund, subject to any transfers to be made on such date pursuant to the terms described under the heading Priority of Funds in Event of Debt Service Fund Shortfall, the Trustee shall withdraw and apply the necessary moneys to provide for such insufficiency from the following Funds and Accounts in the following order: (i) amounts in the Redemption Account of the Subordinated Debt Service Fund not yet committed to the redemption of Bonds, (ii) the General Fund, (iii) amounts in the Revolving Loan Fund not yet committed to loans to Local Bodies, (iv) the Rate Stabilization Fund, (v) the Water Pollution Abatement Fund, (vi) the Renewal and Replacement Reserve Fund, (vii) the Insurance Reserve

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Fund, (viii) the Operating Reserve Fund, (ix) the Commonwealth Obligation Fund, (x) [Reserved], (xi) [Reserved], (xii) the Common Account in the Subordinated Debt Service Reserve Fund, (xiii) the Costs of Issuance Fund and, (xiv) the Construction Fund. (Section 509(e))

Debt Service Reserve Fund

(a) Amounts on deposit in each of the Subaccounts within the Common Account in the Debt Service Reserve Fund shall be applied on a pro rata basis, to the extent other funds are not available therefor pursuant to the General Resolution, solely to pay the Principal Installments of and interest on the Bonds when due. Amounts on deposit in each of the Special Accounts in the Debt Service Reserve Fund shall be applied, to the extent other funds are not available therefor pursuant to the General Resolution, solely to pay the Principal Installments of and interest on the Bonds of the Series to which such Special Account relates as and when specified in the applicable Supplemental Resolution.

(b) If, as of June 30, or, if such day is not a Business Day, on the next preceding Business Day, the amount in the Common Account exceeds the Debt Service Reserve Fund Requirement for the Fiscal Year then ending after giving effect to any Financial Guaranty deposited in the Common Account, the Trustee shall withdraw from the Common Account the amount of any excess therein as of the date of such withdrawal and deposit the moneys so withdrawn (i) if and to the extent that such excess occurred on account of a reduction of the Debt Service Reserve Fund Requirement or the deposit of a Financial Guaranty, into the Redemption Account of the Debt Service Fund or the Redemption Account of the Subordinated Debt Service Fund, as the Authority shall direct, to be applied to the redemption of Secured Bonds and (ii) otherwise, first into the Interest Account of the Debt Service Fund until the amount on deposit therein is equal to the next deposit required to be made to such Account pursuant to the provisions of the General Resolution described in paragraph (a) under the heading Flow of Funds from the Revenue Fund and second to the Principal Account of the Debt Service Fund until the amount on deposit therein is equal to the next deposit required to be made to such Account pursuant to the provisions of the General Resolution described in paragraph (a) under the heading Flow of Funds from the Revenue Fund. Any balance of such excess remaining shall be applied as provided in the previous sentence with respect to deposits required pursuant to the provisions of the General Resolution described in paragraph (a) under the heading Flow of Funds from the Revenue Fund for as many succeeding months as is necessary to fully apply such excess. If, as of June 30, or, if such day is not a Business Day, on the next preceding Business Day, the amount in any Special Account exceeds its requirement under the applicable Supplemental Resolution for the Fiscal Year then ending, after giving effect in the case of each such Account to any Financial Guaranty deposited in such Account, the Trustee shall withdraw from such Account the amount of any excess therein as of the date of such withdrawal and deposit the moneys so withdrawn (i) if and to the extent that such excess occurred on account of a reduction of a reserve requirement or the deposit of a Financial Guaranty, into the Redemption Account of the Debt Service Fund or the Redemption Account of the Subordinated Debt Service Fund, as the Authority shall direct, to be applied to the redemption of Secured Bonds and (ii) otherwise, first into the applicable Subaccount of the Interest Account of the Debt Service Fund until the amount on deposit therein is equal to the next deposit required to be made to such Subaccount pursuant to the General Resolution and second to the related Subaccount of the Principal Account of the Debt Service Fund until the amount on deposit therein is equal to the next deposit required to be made to such Subaccount pursuant to the provisions of the General Resolution described in paragraph (a) under the heading Flow of Funds from the Revenue Fund. Any balance of such excess remaining shall be applied as provided in the previous sentence with respect to deposits required pursuant to the provisions of the General Resolution described in paragraph (a) under the heading Flow of Funds from the Revenue Fund for as many succeeding months as is necessary to fully apply such excess.

(c) Whenever the amount (exclusive of Financial Guaranties) in all of the Accounts in the Debt Service Reserve Fund, together with the amount in the Debt Service Fund, is sufficient to pay all Outstanding Series of Bonds in accordance with their respective terms, the funds on deposit in the Debt Service Reserve Fund shall be transferred to the Debt Service Fund and applied to the redemption or payment at maturity of all Bonds Outstanding.

(d) In lieu of the required deposits and transfers to any Account in the Debt Service Reserve Fund, the Authority may cause to be deposited in any such Account Financial Guaranties. The Financial Guaranties shall be payable (upon the giving of notice as required under the General Resolution) on any date on which moneys will be required to be withdrawn from the applicable Account in the Debt Service Reserve Fund and such withdrawal cannot be met by moneys on deposit in the applicable Account. If a disbursement is made pursuant to Financial Guaranties,

the Authority shall be obligated either (i) to reinstate the maximum limits of such Financial Guaranties or (ii) to deposit into the applicable Account, funds in the amount of the disbursement made under such Financial Guaranties.

(e) In the event of the refunding of any Bonds, the Trustee shall, upon the written direction of the Authority, withdraw from the Subaccount and Account related to the Bonds to be refunded all or any portion of the amounts accumulated therein with respect to the Bonds to be refunded and deposit such amounts as provided in such written direction; provided that such withdrawal shall not be made unless (i) immediately thereafter the bonds being refunded shall be deemed to have been paid pursuant to the General Resolution, and (ii) after giving effect to any amounts being simultaneously deposited therein, the amount remaining in each Subaccount and Account after such withdrawal shall not be less than the applicable Requirement. (Section 510)

Subordinated Debt Service Reserve Fund

Moneys in the Subordinated Debt Service Reserve Fund shall be applied to the Subordinated Bonds in a manner similar to the application of moneys in the Debt Service Reserve Fund to payment of Bonds. (Section 511)

Commonwealth Obligation Fund

Moneys in the Commonwealth Obligation Fund shall be transferred to the Commonwealth to satisfy Commonwealth Obligations due and payable by the Authority; provided that moneys in such Fund which are to be applied to Special Payment Obligations shall be transferred as directed by a Certificate of an Authorized Representative. The Trustee shall also apply moneys in the Commonwealth Obligation Fund as provided under the headings Priority of Funds in Event of Debt Service Fund Shortfall and Priority of Funds in Event of Subordinated Debt Service Fund Shortfall. If as of any June 30, the amount on deposit in the Commonwealth Obligation Fund is in excess of the amount payable on the Commonwealth Obligations in the Fiscal Year then ending then such excess shall be transferred to the Revenue Fund. (Section 512)

Certain Notices

So long as the SRF Bonds are outstanding, the Authority agrees to provide to the Trust notice of any draw pursuant to the provisions described under the heading Priority of Funds in Event of Debt Service Fund Shortfall or Priority of Funds in Event of Subordinated Debt Service Fund Shortfall or any draw on the Community Obligation and Revenue Enhancement Fund or Debt Service Reserve Fund for the purpose of paying debt service on any Secured Bond. (Sixth Supplemental Resolution Section 308)

Operating Reserve Fund

(a) Moneys in the Operating Reserve Fund shall be transferred to the Operating Fund to be applied to the payment of Operating Expenses upon delivery of a Certificate of an Authorized Representative of the Authority to the effect that moneys on deposit in the Operating Fund are insufficient therefor. The Trustee shall also apply moneys in the Operating Reserve Fund as provided under the headings Priority of Funds in Event of Debt Service Fund Shortfall and Priority of Funds in Event of Subordinated Debt Service Fund Shortfall.

(b) If on any December 31 or June 30 Revenues are insufficient to make the deposits to the Operating Reserve Fund required to be made from the Reserve Fund, or if on any date the Authority delivers a Certificate to the Trustee to the effect that moneys in the Operating Fund and the Operating Reserve Fund are insufficient to meet Operating Expenses then due and payable then, subject to any transfers to be made on such date provided under the headings Priority of Funds in Event of Debt Service Fund Shortfall and Priority of Funds in Event of Subordinated Debt Service Fund Shortfall, the Trustee shall withdraw and apply the necessary moneys to provide for such insufficiency from the following Funds and Accounts in the following order: (i) the General Fund; (ii) amounts in the Revolving Loan Fund not yet committed to loans to Local Bodies; (iii) the Rate Stabilization Fund; (iv) the Water Pollution Abatement Fund; (v) the Renewal and Replacement Reserve Fund; and (vi) the Insurance Reserve Fund. On each June 30, excesses in the Operating Reserve Fund shall be transferred to the Revenue Fund. (Section 514)

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Insurance Reserve Fund

(a) Moneys in the Insurance Reserve Fund may be applied by the Authority only to the purpose and in the manner provided for the proceeds of insurance set forth in the General Resolution. The Trustee shall also apply moneys in the Insurance Reserve Fund as provided under the headings Priority of Funds in Event of Debt Service Fund Shortfall and Priority of Funds in Event of Subordinated Debt Service Fund Shortfall.

(b) If on any day on which a transfer from the Revenue Fund to the Insurance Reserve Fund is required pursuant to the General Resolution Revenues are insufficient to make the deposits to the Insurance Reserve Fund required by General Resolution to be made from the Revenue Fund, or if on any date the Authority delivers a Certificate to the Trustee to the effect that moneys in the Insurance Reserve Fund are insufficient to meet claims properly payable from such Fund then due and payable then, subject to any transfers to be made on such date provided under the headings Priority of Funds in Event of Debt Service Fund Shortfall, Priority of Funds in Event of Subordinated Debt Service Fund Shortfall and Operating Reserve Fund, the Trustee shall withdraw and apply the necessary moneys to provide for such insufficiency from the following Funds and Accounts in the following order: (i) the General Fund; (ii) amounts in the Revolving Loan Fund not yet committed to loans to Local Bodies; (iii) the Rate Stabilization Fund; (iv) the Water Pollution Abatement Fund and (v) the Renewal and Replacement Reserve Fund. On each June 30 excesses in the Insurance Reserve Fund shall be transferred to the Revenue Fund. (Section 515)

Renewal and Replacement Reserve Fund

(a) Moneys in the Renewal and Replacement Reserve Fund shall be applied as hereinafter provided to the Cost of any Capital Improvement which is not provided for by moneys available in the Construction Fund or the Operating Fund. The Trustee shall withdraw from such Fund and deposit in one or more special separate Subaccounts established for such purpose in the Construction Fund or, if the Authority has by resolution determined to subsequently finance such Capital Improvement by the issuance of Secured Bonds in a Subaccount relating to such Secured Bonds, any amount requested by the Authority but only upon receipt of a certificate of an Authorized Representative (i) specifying the Capital Improvement to which such amount will be applied, its estimated Cost and estimated completion date and (ii) certifying (a) that such Capital Improvement is reasonably required for the continued operation of the System or the maintenance of Revenues, (b) that all or a portion of the Cost of such Capital Improvement was not included in the Cost of Capital Improvements to be financed in whole or in part from the Operating Fund and (c) that only the Cost of such Capital Improvement that is in excess of the amounts available therefor in such Fund, is being or has previously been requisitioned from the Renewal and Replacement Reserve Fund. Upon completion of such Capital Improvement, any amount so deposited and not necessary to pay the Cost of such Capital Improvement shall be redeposited in the Renewal and Replacement Reserve Fund. The Trustee shall also apply moneys in the Renewal and Replacement Reserve Fund as provided under the headings Priority of Funds in the Event of Debt Service Fund Shortfall, Priority of Funds in Event of Subordinated Debt Service Shortfall, Operating Reserve Fund and Insurance Reserve Fund.

(b) If on any day on which a transfer from the Reserve Fund to the Renewal and Replacement Reserve Fund is required provided under the headings Priority of Funds in Event of Debt Service Fund Shortfall, Priority of Funds in Event of Subordinated Debt Service Shortfall, Operating Reserve Fund and Insurance Reserve Fund Revenues are insufficient to make the deposits to the Renewal and Replacement Reserve Fund required to be made from the Revenue Fund, or if on any date the Authority delivers a Certificate to the Trustee to the effect that moneys in the Renewal and Replacement Reserve Fund are insufficient to meet the Costs of a Capital Improvement to be funded as described in paragraph (a) above then due and payable then, subject to any transfers to be made on such date provided under the headings Priority of Funds in Event of Debt Service Fund Shortfall, Priority of Funds in Event of Subordinated Debt Service Shortfall, Operating Reserve Fund and Insurance Reserve Fund, the Trustee shall withdraw and apply the necessary moneys to provide for such insufficiency from the following Funds and Accounts in the following order: (i) the General Fund; (ii) amounts in the Revolving Loan Fund not yet committed to loans to Local Bodies; (iii) the Rate Stabilization Fund and (iv) the Water Pollution Abatement Fund.

(c) If on any June 30 or, if such day is not a Business Day, on the next preceding Business Day, the amount in the Renewal and Replacement Fund is in excess of the Renewal and Replacement Reserve Cash Requirement for the Fiscal Year then ending, such excess shall be transferred to the Revenue Fund or shall be retained

in the Renewal and Replacement Reserve Fund upon the delivery of a Certificate of an Authorized Representative of the Authority to the effect that such amounts being retained are necessary to meet the Costs of Capital Improvements properly payable from such Fund as described in paragraph (a) above.

Water Pollution Abatement Fund

(a) Moneys in the Water Pollution Abatement Fund shall be transferred as directed by the Authority for the payment of Water Pollution Abatement Obligations upon receipt by the Trustee of the Certificate of an Authorized Representative that moneys in respect to Water Pollution Abatement Obligations are due and payable by the Authority. The Trustee shall also apply moneys in the Water Pollution Abatement Fund as described under the headings Priority of Funds in Event of Debt Service Fund Shortfall, Priority of Funds in Event of Subordinated Debt Service Fund Shortfall, Operating Reserve Fund, Insurance Reserve Fund and Renewal and Replacement Reserve Fund.

(b) On each June 30, excesses in the Water Pollution Abatement Fund shall be transferred to the Revenue Fund. (Section 516A)

Rate Stabilization Fund

Moneys shall be transferred to the Rate Stabilization Fund from the General Fund as provided in the General Resolution. Moneys in the Rate Stabilization Fund may be transferred to a separate Subaccount of the Construction Fund upon receipt of a Certificate of an Authorized Representative to the effect that such moneys are necessary to pay the Costs of Projects for which no other funds in the Construction Fund are available. Moneys in the Rate Stabilization Fund shall be transferred to the Revenue Fund upon delivery to the Trustee of a Certificate of an Authorized Representative of the Authority or in accordance with the provisions of an Operating Budget. The Trustee shall also apply moneys in the Rate Stabilization Fund as described under the headings Priority of Funds in Event of Debt Service Fund Shortfall, Priority of Funds in Event of Subordinated Debt Service Fund Shortfall, Operating Reserve Fund, Insurance Reserve Fund and Renewal and Replacement Reserve Fund. Moneys in the Rate Stabilization Fund shall also be transferred to the Note Payment Fund and applied to the payment of principal of and interest on Bond Anticipation Notes to the extent provided in any Supplemental Resolution authorizing such notes. (Section 517)

Revolving Loan Fund

Moneys in the Revolving Loan Fund shall be used to make loans on such terms and conditions as the Authority may deem appropriate to Local Bodies receiving water or sewer service from the Authority for the purpose of financing capital improvements to be made to the water distribution and waste-water collection systems of such Local Bodies. Repayments of principal and interest on such loans shall be transferred upon receipt by the Authority to the Trustee and deposited in the Revolving Loan Fund unless the Authority shall instruct the Trustee that repayments of interest on such loans are to be deposited in the Revenue Fund. Any such interest payments deposited in the Revenue Fund shall be deemed "Revenues." Any such loans and repayments, together with any notes or other instruments evidencing such loans and any security provided therefor and the rights to receive such repayments, and any amounts on deposit in the Revolving Loan Fund committed to funding such loans may be pledged as security for any Indebtedness incurred pursuant to the General Resolution for the purpose of funding such loans. The Trustee shall also apply moneys in the Revolving Loan Fund as described under the headings Priority of Funds in Event of Debt Service Fund Shortfall, Priority of Funds in Event of Subordinated Debt Service Fund Shortfall, Operating Reserve Fund, Insurance Reserve Fund and Renewal and Replacement Reserve Fund. (Section 518)

General Fund

(a) Moneys in the General Fund shall be transferred to the Rate Stabilization Fund upon delivery to the Trustee of a Certificate of an Authorized Representative of the Authority (i) to the effect that, for the previous Fiscal Year, the requirements of the Combined Bond Coverage Requirement shall have been satisfied and (ii) setting forth the amount of Revenues Available for Bond Debt Service for such period in excess of Primary Bond Coverage Requirement for such period which are then on deposit in the General Fund to be transferred by the Trustee to the Rate Stabilization Fund, provided that the transfer shall not be in an amount greater than such excess. The Trustee shall also transfer moneys in the General Fund to a separate subaccount of the Construction Fund upon receipt of a

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Certificate of an Authorized Representative to the effect that such moneys are necessary to pay the Costs of Projects for which no other funds in the Construction Fund are available. Moneys in the General Fund may also be transferred to the Redemption Account and applied to the redemption of Secured Bonds. The Trustee shall also apply moneys in the General Fund as described under the headings Priority of Funds in Event of Debt Service Fund Shortfall, Priority of Funds in Event of Subordinated Debt Service Fund Shortfall, Operating Reserve Fund, Insurance Reserve Fund and Renewal and Replacement Reserve Fund. Moneys in the General Fund shall also be transferred to the Note Payment Fund and applied to the payment of principal of and interest on Bond Anticipation Notes to the extent provided in any Supplemental Resolution authorizing such notes.

(b) On any date, subject to the requirements of the shortfall provisions of the Debt Service Fund, the Subordinated Debt Service Fund, the Operating Reserve Fund, the Insurance Reserve Fund and the Renewal and Replacement Reserve Fund, the Authority may, by a Certificate of its Authorized Representative and without any further showing, direct that moneys be transferred from the General Fund to any Fund or Account established under the General Resolution other than the Revenue Fund, the Operating Fund, the Principal and Interest Accounts in the Debt Service Fund and the Rate Stabilization Fund. (Section 519)

Note Payment Fund

(a) The Authority shall deposit into a separate account the Note Payment Fund the proceeds of any Secured Bonds issued to provide for the payment of Bond Anticipation Notes of the Authority as directed by the Supplemental Resolution for such Secured Bonds and shall deposit amounts transferred pursuant to the General Resolution as described in paragraph (a) under the heading Subordinated Debt Service Fund and paragraph (a) under the heading General Fund.

(b) Moneys on deposit in a subaccount of the Note Payment Fund shall be applied to the payment of the Bond Anticipation Notes with respect to which such subaccount was established upon receipt by the Trustee of a Certificate of the Authority as required by General Resolution. Any moneys remaining in a subaccount of the Note Payment Fund after payment of the Bond Anticipation Notes with respect to which such account was established shall be transferred to and deposited in a separate subaccount established within the Construction Fund. (Section 520)

Depositaries

All moneys or securities held by the Trustee under the provisions of the General Resolution shall constitute trust funds and the Trustee may, and shall, if directed in writing by an Authorized Representative of the Authority, deposit such moneys or securities with one or more Depositaries in trust for the Trustee. Moneys or securities in the Operating Fund shall be deposited by the Authority with one or more Depositaries in trust for the authority. All moneys or securities deposited under the provisions of the General Resolution with the Trustee or any Depositary shall be held in trust and applied only in accordance with the provisions of the General Resolution, and each of such Funds established by the General Resolution shall be a trust fund for the purposes thereof. Each Depositary holding moneys or securities in trust for the Trustee shall be a bank or trust company organized under the laws of the Commonwealth or a national banking association (having its principal office with the Commonwealth), having capital stock, surplus and undivided earnings aggregating at least \$100,000,000 (or such greater amount as set forth in a Supplemental Resolution) and willing and able to accept the office on reasonable and customary terms and authorized by law to act in accordance with the provisions of the General Resolution. (Section 521)

Investment of Certain Funds

(a) Moneys held in the Debt Service Fund, the Subordinated Debt Service Fund and the Note Payment Fund shall be invested and reinvested by the Trustee to the fullest extent practicable in Investment Securities (other than those of the type described in subparagraph (e) of the definition of Investment Securities in the General Resolution) which mature not later than at such times as shall be necessary to provide moneys when needed for payments to be made from such Funds. Subject to the provisions of the General Resolution, moneys held in the Debt Service Reserve Fund and the Subordinated Debt Service Reserve Fund shall be invested and reinvested by the Trustee to the fullest extent practicable in Investment Securities (other than those of the type described in subparagraph (e) of the definition of Investment Securities in the General Resolution) which mature not later than at such times as shall be necessary to provide moneys when needed for payment to be made from such Funds. Moneys held in any other

Fund or Account established under the General Resolution may be invested and reinvested in Investment Securities. The Trustee shall make all such investments of moneys held by it in accordance with written instructions from any Authorized Representative of the Authority, which may for this purpose include one or more investment advisors designated in writing by such Representative from time to time. In making any investment in any Investment Securities with moneys in any Fund or Account established under the General Resolution, the Authority and the Trustee may combine such moneys with moneys in any other Fund or Account. Moneys in any Fund or Account shall be invested so as to mature not later than such times as shall be necessary to provide moneys when needed for payments to be made from such Fund or Account.

(b) Interest (net of that which represents a return of accrued interest paid in connection with the purchase of any investment) and other investment earnings on any moneys or investments in the Funds and Accounts, other than the Construction Fund, the Cost of Issuance Fund, the Operating Fund, the Note Payment Fund, the Debt Service Fund, the Debt Service Reserve Fund, the Subordinated Debt Service Fund and the Subordinated Debt Service Reserve Fund shall be paid into the Revenue Fund, on the last Business Day of each month.. Interest and other investment earnings on any moneys or investments in the Operating Fund, the Debt Service Fund, the Subordinated Debt Service Fund and the Note Payment Fund shall be retained in the Fund in which such earnings accrued; provided that the Authority may direct that the earnings on moneys in the Operating Fund may be deposited in the Revenue Fund. Interest and other investment earnings on any moneys or investments in the Debt Service Fund and the Debt Service Reserve Fund shall be paid on the last Business Day of each month, first to the Interest Account of the Debt Service Fund and second to the Principal Account of the Debt Service Fund; and interest and any other investment earnings on the Subordinated Debt Service Reserve Fund shall be paid on the last Business Day of each month, first to the Interest Account of the Subordinated Debt Service Fund and second to the Principal Account of the Subordinated Debt Service Fund; provided, however, that the Authority may direct that investment earnings on any moneys or investments in the Debt Service Fund or the Subordinated Debt Service Reserve Fund may be deposited for such period of time as the Authority may determine in the Revenue Fund or the Construction Fund if the authority shall obtain a Bond Counsel's Opinion to the effect that such application of earnings shall not adversely affect the exclusion of interest on any Tax Exempt Indebtedness from gross income of the holder for federal income tax purposes. Interest and other investment earnings on any other moneys of investments in Construction Fund attributable to any subsequent series of Secured Bonds shall be paid on the last Business Day of each month, to the related Subaccounts of the Debt Service Fund (or the Subordinated Debt Service Fund if so specified in the applicable Supplemental Resolution) first to the Interest Account and second to the Principal Account; provided, however, that the Authority may from time to time direct that all or a portion of such earnings may be retained in the Construction Fund for any period of time if there shall be provided a Certificate of an Authorized Officer of the Authority on the date of such direction and on each July 1 thereafter, so long as such direction remains in effect, (i) certifying for the most recent preceding period of twelve consecutive months, Revenues Available for Bond Debt Service were at least equal to the Primary Bond Coverage Requirement for both the current the Primary Bond Coverage Requirement and (ii) projecting that Revenues Available for Bond Debt Service will be at least equal to and, if the period so directed by Authority includes it, the following fiscal year. Earnings retained in the Construction Fund will not be included in the calculation of Revenues Available for Bond Debt Service. For purposes of this paragraph, interest shall not include the return of accrued interest paid in connection with the purchase of any investment.

(c) Notwithstanding the foregoing, the Authority may direct that investment earnings reasonably expected to be subject to the requirements of section 148(f) of the Code or the Treasury Regulations applicable thereto may be deposited directly to the Rebate Fund to the extent desirable to comply with the requirements of section 148(f) of the Code or the Treasury Regulations applicable thereto. (Section 523 and Second Supplemental Resolution Section 401)

(d) Pursuant to the provisions described in paragraph (b), investment earnings derived from moneys on deposit from time to time in the Construction Fund and the Subordinated Debt Service Fund attributable to the SRF Bonds shall be transferred on the last Business Day of each month to the related Subaccounts of the Subordinated Debt Service Fund, first to the Interest Subaccount and second to the Principal Subaccount. (Section 523)

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Valuation and Sale of Investments

Obligations purchased as an investment of moneys in any Fund created under the provisions of the General Resolution shall be deemed at all times to be a part of such Fund and any profit realized from the liquidation of such investment shall be credited to such Fund and any loss resulting from the liquidation of such investment shall be charged to such Fund.

In computing the amount in any Fund created under the provisions of the General Resolution for any purpose provided in the General Resolution, obligations purchased as an investment of moneys therein shall be valued at the amortized cost of such obligations or the market value thereof, whichever is lower. Any deficiency resulting from a decrease in the valuation of investments held in the Debt Service Reserve Fund may be disregarded for purposes of calculating deposits required from the Revenue Fund (but not for purposes of deposits required to make the amount on deposit in each Subaccount of the Debt Service Reserve Fund equal to the applicable Series Debt Service Reserve Fund Requirement) provided that the amount on deposit in the Debt Service Reserve Fund is at least 95% of the Debt Service Fund Requirement. The accrued interest paid in connection with the purchase of any obligation shall be included in the value thereof until interest on such obligation is paid. Such computation shall be made annually on June 30 for all Funds and at such other times as the Authority shall determine or as may be required by the General Resolution. (Section 524)

Rebate Fund

Upon the issuance, sale and delivery of any Series of Indebtedness subject to the Rebate Fund Requirement, the Trustee shall establish a separate account within the Rebate Fund for such Series. Funds on deposit in the Rebate Fund shall be applied as set forth in the applicable Supplemental Resolution. Unless otherwise specified in the applicable Supplemental Resolution, interest or other income derived from the investment or deposit of moneys in the Rebate Fund shall be transferred to the Revenue Fund. (Section 525)

Holding of Special Deposits

Except as otherwise provided in any Supplemental Resolution, (i) any Grant Receipts held by or for the account of the Authority in connection with the System which are required to be applied under the terms of the applicable Grant Agreement directly to the payment of Costs of acquisition, construction or alteration of a Project which is the subject of such Grant Agreement and (ii) any Grant Receipts or other moneys which have been pledged to the payment of any Special Subordinated Indebtedness issued pursuant to the provisions of the Operating Reserve Fund described in paragraph (a)(i) or (b) under the heading Special Subordinated Indebtedness (including, without limitation, proceeds of any such indebtedness) and (iii) any moneys which are subject to refund by the Authority or held for the account of others including, without limitation, any amounts which, under any agreement by the Authority providing for adequate separation of such amounts from Revenues, are collected by the Authority on behalf of others for services rendered or commodities provided to customers of the System, any amounts deducted by the Authority from wage and salary payments to the employees of the Authority, any amounts contributed by the Authority to any pension or retirement fund or system which amounts are held in trust for the benefit of the employees of the Authority and any amounts held as deposits and (iv) any state debt service assistance which the Authority elects not to include in Revenues, together with any investments of such Grant Receipts or other moneys and interest and profits thereon to the extent such interest and profits are also pledged, segregated or held for the account of others or subject to refund to others, may be held by the Authority in such manner and in such depositories or accounts, outside of the various Funds and Accounts established by the General Resolution, as the Authority may otherwise provide. At the election of the Authority such Grant Receipts and other moneys may be deposited in separate accounts maintained by the Authority with the Trustee or any other Depository; moneys described in clause (iv) above shall be deposited by the Trustee in the Debt Service Fund or the Subordinated Debt Service Fund upon the instructions of the Authority, which instructions shall specify the timing and amount of each such deposit and the Account or Accounts of such Funds to which the deposits are to be made. (Section 526)

Covenants of the Authority

In the General Resolution, the Authority covenants, among other things, as follows:

Covenant as to Rates and Charges: Debt Service Coverage Ratio

(a) The Authority shall for each Fiscal Year fix and adjust Rates and Charges with respect to its Waterworks and Sewer Operations, which Rates and Charges shall be adopted by the Authority's Board of Directors strictly in accordance with the provisions of the Act as in effect on the original date of adoption of the General Resolution (i.e. January 24, 1990) and which adoption shall be conclusive and final and not subject to supervision or regulation by any office, department, division, commission, board, bureau or agency of the Commonwealth or any of its political subdivisions, so as to provide funds, in the aggregate and separately, with respect to costs and operations allocable to the Waterworks and Sewer Operations at least sufficient with other revenues of the Authority, if any, available therefor (i) to pay all Current Expenses, (ii) to pay all Debt Service on Indebtedness of the Authority as the same becomes due and payable, (iii) to create and maintain all reserves established pursuant to the General Resolution or reasonably required by any other agreement securing Indebtedness of the Authority or as otherwise determined by the Authority to be necessary or desirable, (iv) to pay all costs of maintenance and replacement of the System, and costs of improving, extending and enlarging the System as determined by the Authority to be necessary or desirable, to be funded as Current Expenses in order to carry out the purposes of the Authority, (v) to provide for payments to the Commonwealth for debt service as provided in the Act, and (vi) to pay or provide for all amounts which the Authority may be obligated to pay or provide for by any law or contract including the General Resolution or other agreement securing Indebtedness of the Authority and including any amount to be repaid to the Commonwealth to reimburse the Commonwealth for the debt service paid by the Commonwealth on a bond issued under Section 5(f) of the Act. The charges of the Authority for delivery of water and for sewage collection, disposal and treatment services shall be established as charges of general application to be borne by the local body utilizing such services (provided, however, that the Authority reserves the right to impose charges of special application in accordance with the Act) and shall be established at a level sufficient to meet the revenue requirements of the Authority as described in this paragraph.

(b) Without limiting the provisions described in paragraph (a) above, the Authority shall fix and adjust Rate and Charges, which Rates and Charges shall be adopted by the Authority's Board of Directors strictly in accordance with the provisions of the Act as in effect on the original date of adoption of the General Resolution and which adoption shall be conclusive and final and not subject to supervision or regulation by any office, department, division, commission, board, bureau or agency of the Commonwealth or any of its political subdivisions, sufficient to provide Revenues Available for Bond Debt Service in each Fiscal Year that are (i) at least equal to the Primary Bond Coverage Requirement and (ii) so long as any Parity Subordinated Bonds shall be Outstanding, at least equal to the Secured Bond Coverage Requirement.

(c) Without limiting the provisions described in paragraph (a) or (b) above, the Authority shall fix and adjust Rates and Charges, which Rates and Charges shall be adopted by the Authority's Board of Directors strictly in accordance with the provisions of the Act as in effect on the original date of adoption of the General Resolution and which adoption shall be conclusive and final and not subject to supervision or regulation by any office, department, division, commission, board, bureau or agency of the Commonwealth or any of its political subdivisions, sufficient to provide Revenues Available for Subordinated Debt Service in each Fiscal Year at least equal to the coverage requirement, if any, set forth in a Supplemental Resolution in connection with a Series of Subordinated Bonds.

(d) The Primary Bond Coverage Ratio and the Supplemental Bond Coverage Ratio may be adjusted from time to time by the Authority by the adoption of a Supplemental Resolution provided that: (i) the Authority shall have provided evidence to the Trustee that the details of such adjustment have been provided in writing to each Rating Agency then assigning a rating on Outstanding Secured Bonds and that each such Rating Agency has either (x) confirmed in writing that such adjustment will not adversely affect such ratings or (y) issued a rating on a Series of Bonds to be issued which is not less than the rating assigned by such Rating Agency to Outstanding Bonds of such category, or any other evidence satisfactory to the Trustee that such adjustment will not adversely affect the then current ratings, if any, assigned to any Outstanding Secured Bonds by and Rating Agency; and (ii) the Primary Bond Coverage Ratio shall not be less than 1.1; and (iii) no such adjustment shall cause the sum of (x) the Primary Bond Coverage Ratio and (y) the Supplemental Bond Coverage Ratio to be less than 1.2.

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(e) If in any Fiscal Year Revenues shall not satisfy the requirements described in paragraph (a) above, or Revenues Available for Bond Debt Service or Revenues Available for Subordinated Debt Service shall not satisfy the requirements described in paragraph (b) or (c) above, respectively, then the Authority shall not be deemed to be in default under the General Resolution so long as it shall have complied or is diligently proceeding to comply with the requirements described in paragraphs (f) and (g) below.

(f) On or before the last day of each Fiscal Year the Authority shall review the adequacy of its rates, fees, rentals and other charges with respect to the System and the Authority's other corporate purposes to satisfy the requirements described under this heading for the next succeeding Fiscal Year. If such review, or any report of a Consulting Engineer or Rate Consultant provided in connection with such review or in accordance with any section hereof, indicates that the rates, fees, rentals and other charges with respect to the System and the Authority's other corporate purposes are, or are likely to be, insufficient to meet the requirements described under this heading for the next succeeding Fiscal Year, or if it otherwise appears at any time during such Fiscal Year that rates, fees, rentals and other charges with respect to the System and the Authority's other corporate purposes are or are likely to be insufficient to meet such requirements, the Authority shall promptly take such steps as are permitted by law and as are necessary to cure or avoid the deficiency.

(g) Within one hundred and eighty (180) days of the close of each Fiscal Year while Bonds are Outstanding, the Authority shall deliver to the Trustee a certificate of an Authorized Representative stating, if such was the case, that the Authority satisfied the requirements described in paragraphs (a), (b) and (c) above in such Fiscal Year or, if such was not the case, specifying in reasonable detail the corrective steps taken by the Authority so that it will comply with such requirements in the then current Fiscal Year. Such certificate shall be accompanied by a Certificate of the Accountant in accordance with the General Resolution setting forth the amounts for the preceding Fiscal Year which are necessary to determine compliance with the requirements described in paragraph (a), (b) or (c) above. If the amounts set forth in the certificate of the accountants indicate that the Authority was not in compliance for such Fiscal Year with the provisions described in paragraph (a), (b) or (c) above, the Consulting Engineer or Rate Consultant shall review the adequacy of the Authority's rates, fees, rentals and other charges with respect to the System and shall recommend changes necessary for the Authority to be in compliance with the provisions described in paragraphs (a), (b) and (c) above by the end of the then current Fiscal Year. The Authority covenants, to the extent permitted by and in accordance with the Act, to use its best efforts to effect such changes as are so recommended by the Consulting Engineer or Rate Consultant. (Section 705)

Sale, Lease or Encumbrance of Property

(a) Except as provided under this heading and authorized under the Act, no part of the System shall be sold, mortgaged, leased or otherwise disposed of or encumbered.

(b) The Authority may from time to time sell or exchange or otherwise dispose of at any time and from time to time any property or facilities constituting part of the System which either (1) are worn out or obsolete or (2) in the opinion of the Authority are no longer useful in the operation of the System and, if the market value of such property or facilities to be sold or otherwise disposed of in any Fiscal Year, as determined by the Authority, is in excess of one tenth of one percent (.1%) of the book value of the entire System, the Authority delivers to the Trustee a certificate of an Authorized Representative stating, in the opinion of the signer, that the sale, exchange or other disposition of such property or facilities will not impair the ability of the Authority to satisfy the Rates and Charges covenants in the then current or any future Fiscal Year. Any proceeds of such sale, exchange or other disposition not used to replace the property so sold or exchanged shall be deposited by the Authority in the Revenue Fund.

(c) To the extent permitted by the Act, the Authority may mortgage, grant security interests in, or otherwise encumber any real or personal property included in the System, or may lease any lessee any real or personal property to be used in the operation of the System, provided that the aggregate annual payments required to be made by the Authority under all such mortgages, security interests, encumbrances and leases shall not in any Fiscal Year exceed twenty-five percent (25%) of the total Current Expenses for such Fiscal Year as shown in the Current Expense Budget then in effect. The proceeds of sale, if any, of any such property mortgaged or otherwise encumbered, after satisfying the mortgage, security interest or other encumbrance secured by the same, shall be deposited in the Revenue Fund. Until so deposited, such proceeds shall not be deemed Revenues under the General Resolution.

(d) To the extent permitted by the Act, the Authority may lease as lessor or make contracts or grant licenses for the operation of, or grant easements or other rights with respect to, any part of the System if such lease, contract, license, easement or right does not, in its opinion (as evidenced, in the event of any such lease, contract, license, easement or right which extends for more than one year or which is irrevocable, by a Certificate of an Authorized Representative delivered to the Trustee), impede the operation by the Authority of the System. Except as detailed under the heading Special Subordinated Indebtedness, any payments to the Authority under or in connection with any such lease, contract, license, easement or right (except any such payments specifically excluded from the definition of Revenues) shall constitute Revenues under the General Resolution. (Section 706)

Operation, Maintenance and Reconstruction

(a) The Authority shall operate, or cause to be operated, the System properly and in a sound, efficient and economical manner and shall maintain, preserve, and keep the same or cause the same to be maintained, preserved, and kept in good repair and operating condition, and shall from time to time make, or cause to be made, all necessary and proper repairs, replacements and renewals so that the operation of the System may be properly and advantageously conducted, and, if any useful part of the System is damaged or destroyed or taken through the exercise of eminent domain, the Authority shall, as expeditiously as practicable, commence and diligently prosecute the replacement or reconstruction of such damaged or destroyed part so as to restore the same to use and the replacement of such part so taken; provided, however, that nothing in the General Resolution shall require the Authority to operate, maintain, preserve, repair, replace, renew or reconstruct any part of the System if there shall have been filed with the Trustee (1) a certificate of an Authorized Representative stating that in the opinion of the signer (a) abandonment of operation of such part is economically justified and (b) failure to operate, maintain, preserve, repair, replace, renew or reconstruct such part will not impair the ability of the Authority to satisfy the Rates and Charges covenants in the current or any future Fiscal Year, and (2) a certificate of a Consulting Engineer concurring in such opinion of the Authorized Representative if the book value of such part of the System exceeds one percent (1%) of the book value of the entire System.

(b) The Authority shall establish and enforce reasonable rules and regulations governing the operation, use and services of the System. All compensation, salaries, fees and wages paid by the Authority in connection with the maintenance, repair and operation of the System shall be reasonable.

(c) Nothing in the General Resolution shall be deemed to preclude the Authority from undertaking such other Projects or exercising such other powers unrelated to the operation of the System as may be permitted from time to time under the Act and approved by its Board of Directors. (Section 707)

Insurance and Condemnation

(a) The Authority shall at all times either (i) keep all property which is a part of the System and which is of an insurable nature and of the character usually insured by water or sewer utility systems similar to the Authority insured against loss or damage by fire and from other causes customarily insured against and in such relative amounts, and with such deductibles, if any, as are customary, and also at all times maintain insurance against loss or damage from such hazards and risks to persons and the property of others, and with such deductibles, if any, as are usually insured against by water or sewer utility systems similar to the Authority or (ii) maintain the Insurance Reserve Fund at the Insurance Reserve Fund Requirement. In determining the amounts and types of insurance and deductibles, if any, to be maintained under this Section, the Authority may rely upon the advice of a Consulting Engineer or an insurance consultant of recognized standing selected by the Authority and satisfactory to the Trustee. All policies of insurance shall be payable to the Authority or to the Trustee. On or before the last day of each Fiscal Year, the Authority shall deliver to the Trustee a certificate of an Authorized Representative listing the types and amounts of insurance then maintained by the Authority in accordance with this Section and the insurers therefor.

(b) All proceeds of insurance maintained pursuant to paragraph (a) above shall be applied as provided in the General Resolution. Such application may include the redemption of Secured Bonds of the Series to which such moneys relate on the first date on which such Secured Bonds may be called without premium (unless the Authority shall elect to call such Secured Bonds earlier at a premium).

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(c) If any property or facility comprising part of the System shall be taken through the exercise of the power of eminent domain, the Authority shall apply the proceeds of any award received on account of such taking to the replacement of the property or facility so taken or deposit such proceeds in the Renewal and Replacement Reserve Fund or the Operating Reserve Fund to the extent that the costs of such replacement were paid from the Renewal and Replacement Reserve Fund or the Operating Reserve Fund, unless the Authority determines in accordance with the General Resolution not to replace such property or facility. Any proceeds of such award not applied to such replacement or remaining after such work has been completed shall be deposited in the Revenue Fund, except that any proceeds resulting from the taking of all or substantially all of the System shall be deposited with the Trustee in the Redemption Account of the Debt Service Fund for the purpose of redemption of Secured Bonds or for the defeasance of Secured Bonds as provided in the General Resolution. (Section 708)

Consulting Engineer; Rate Consultant

The Authority shall, until the Secured Bonds and the interest thereon shall have been paid or provision for such payment shall have been made, for the purpose of performing and carrying out the duties imposed on the Consulting Engineer by the General Resolution, employ an independent engineer or engineering firm having a nationwide and favorable repute for skill and experience in such work and, except in the case of the firm serving as Consulting Engineer at the time of the adoption of the General Resolution, who shall be reasonably acceptable to the Trustee. (Section 710)

The Authority shall, until the Secured Indebtedness and the interest thereon shall have been paid or provision for such payment shall have been made, for the purpose of performing and carrying out the duties imposed on the Rate Consultant by the General Resolution, employ an independent accountant or firm of independent accountants, or a management consultant or management consulting firm, or independent engineer or engineering firm (which may also be the Consulting Engineer), having, in any case, a nationwide and favorable repute for skill and experience in such work and, except in the case of the firm serving as the Rate Consultant at the time of the adoption of the General Resolution, who shall be reasonably acceptable to the Trustee. (Section 711)

Operating Budget

(a) Not less than thirty (30) days prior to the beginning of each Fiscal Year the Authority shall prepare and deliver to the Trustee a preliminary Operating Budget, and not less than one day prior to the beginning of each Fiscal Year, shall adopt, in accordance with applicable powers, procedures, responsibilities and limitations established by the Act for adoption of the Current Expense Budget, and file with the Trustee a copy of the Operating Budget, duly certified by an Authorized Representative of the Authority, showing on a monthly basis the estimated Operating Expenses to be paid from the Operating Fund and Commonwealth Obligations to be paid from the Commonwealth Obligation Fund, as well as the Revenues or other moneys held under the General Resolution estimated to be available to pay such Operating Expenses and Commonwealth Obligations (including the amount of each item constituting a component thereof) for the ensuing Fiscal Year, together with any other information required to be set forth therein by the General Resolution; provided, however, that the Operating Budget for the Fiscal Year, or portion thereof, in which the first Series of Secured Bonds is issued, may be adopted by any Authorized Officer. Such Operating Budget may set forth such additional information as the Authority may determine. The Authority shall not incur aggregate Operating Expenses and Commonwealth Obligations in any Fiscal Year in excess of the amount budgeted in the Operating Budget, as amended and supplemented for such Fiscal Year, except in case of emergency or as required by law and shall promptly file with the Trustee a written report of any such excess expenditure signed by an Authorized Representative and as soon as practicable thereafter adopt and file with the Trustee an amendment to the Operating Budget.

(b) In conjunction with the adoption and filing, or any amendment, of the Operating Budget, the Authority shall certify the Operating Reserve Fund Requirement for the Fiscal Year to which such Budget relates; provided that (i) the Operating Reserve Fund Requirement shall not be less than one-sixth (1/6) of the annual Operating Expenses set forth in such Budget and (ii) the Authority's certificate shall be consistent with the latest recommendation of the Consulting Engineer made in conjunction with its report pursuant to the General Resolution. In addition, the Authority shall at the same time certify the Renewal and Replacement Reserve Fund Requirement for the Fiscal Year to which such Budget relates; provided that the Authority's certificate shall be consistent with the latest recommendation of the Consulting Engineer made pursuant to the General Resolution. In addition, the Authority will

certify the assumed interest rate on each Series of Variable Rate Indebtedness then Outstanding for which deposits will be required to be made from the Reserve Fund to the Debt Service Fund and the Subordinated Debt Service Fund pursuant to the General Resolution. If the Authority shall not certify the Operating Reserve Fund Requirement or the Renewal and Replacement Reserve Fund Requirements as aforesaid, the requirement for the Fiscal Year shall be the Requirement in effect for the previous Fiscal Year until the new requirement is certified as aforesaid. Notwithstanding the foregoing, the initial Operating Reserve Fund Requirement and Renewal and Replacement Reserve Fund Requirement shall be as set forth in the Supplemental Resolution authorizing the first series of Secured Bonds under the General Resolution.

(c) If for any reason the Authority shall not have adopted the Operating Budget as provided in the General Resolution, the Operating Budget for the then current Fiscal Year shall be deemed to be the Operating Budget for the ensuing Fiscal Year until a new Operating Budget is adopted.

(d) The Authority may at any time adopt an amended Operating Budget for the then current or ensuing Fiscal Year, but no such amended Operating Budget shall supersede any prior Budget until the Authority shall have filed with the Trustee and the Advisory Board a copy of such amended Operating Budget and shall have complied in all respects with the requirements of the Act applicable to the Current Expense Budget in adopting any amended Operating Budget.

(e) In addition to the Authority's right to amend the Operating Budget pursuant to the General Resolution, the Authority may reallocate amounts budgeted to specific items or months within the Operating Budget then in effect at any time by delivery of a Certificate of its Authorized Representative provided that no such reallocation shall result in an increase in the sum of the aggregate Operating Expenses and Commonwealth Obligations for the Fiscal Year covered by such Operating Budget. (Section 712)

Capital Budget

(a) Not less than forty-five (45) days prior to the beginning of each Fiscal Year the Authority shall prepare and file with the Trustee a proposed program of Projects to be undertaken by the Authority during such Fiscal Year and the next two ensuing Fiscal Years, identifying the Projects to be carried out, the estimated Costs thereof and the period of construction thereof, together with a proposed Capital Budget for the Projects to be undertaken in at least the first of such Fiscal Years. Not less than one day prior to the beginning of each Fiscal Year the Authority shall adopt and file with the Trustee a final Capital Budget for the Projects or parts thereof to be undertaken by the Authority in such Fiscal Year. The Capital Budget shall show all projected expenditures as well as the sources of moneys projected to be available to meet the same. The Capital Budget shall further identify the Projects to be undertaken, the nature of the work, the estimated Costs thereof and the estimated completion date of each Project.

(b) The Authority may from time to time amend or supplement the Capital Budget for the Fiscal Year then in progress by filing with the Trustee a certificate of an Authorized Representative setting forth the amendment or supplement. (Section 713)

Accounts and Reports

(a) The Authority shall maintain its books and accounts in accordance with generally accepted accounting principles applicable to water or sewer utilities such as the Authority and in accordance with such other principles of accounting as the Authority deems appropriate. Said books and accounts shall at all times be subject to the inspection of the Trustee and the Holder or Holders of not less than one percent (1%) in principal amount of Outstanding Secured Bonds of any category or their representatives duly authorized in writing.

(b) The Authority shall annually, within one hundred eighty (180) days after the close of each Fiscal Year, file with the Trustee a copy of an annual report for such year, accompanied by financial statements, audited by and containing the report of an independent Accountant relating to the operations and properties of the System for such Fiscal Year and setting forth in reasonable detail its financial condition as of the end of such year and the income and expenses for such year, and including a summary of the receipts in and disbursements from the Funds and Accounts maintained under the General Resolution during such Fiscal Year and the amounts held therein at the end

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of such Fiscal Year. Each report of such accountant or firm of accountants shall state that the financial statements of the Authority were prepared in accordance with generally accepted accounting principles, or shall state in what respects such financial statements do not conform with such generally accepted accounting principles. If in connection with such annual audit such Accountant submits any written recommendations as to internal accounting controls or related matters, such recommendations shall also be filed with the Trustee. Each annual report shall be accompanied by a certificate of the accountant or firm of accountants auditing the same to the effect that in the course of and within the scope of their examination of such financial statements made in accordance with generally accepted auditing standards nothing came to their attention that would lead them to believe that a default had occurred under the General Resolution or, if such is not the case, specifying the nature of the default.

(c) Within one hundred twenty (120) days after the close of every third Fiscal Year following the Fiscal Year in which the initial Series of Bonds under the General Resolution is issued the Authority shall file with the Trustee a copy of a certificate of a Consulting Engineer setting forth in reasonable detail (1) its findings as to whether the properties of the System have been maintained during such three-year period, and are then being maintained, in good repair and sound operating condition, (2) its estimate of the amount, if any, required to be expended to place such properties in such condition and the approximate time required therefor, (3) its recommendations, if any, as to improved management and proper maintenance, repair, and operation of, and capital improvements to, the System during the ensuing three-year period, (4) its recommendations as to the adequacy of the Renewal and Replacement Reserve Fund Requirement to fund emergency repairs and replacements and other expenditures for repairs and replacements not provided for in the Operating Budget and the Capital Budget and (5) its recommendations as to the adequacy of the Authority's rates, fees, rentals and other charges. If such certificate sets forth that the properties of the System are not then being maintained in good repair and sound operating condition, the Authority shall restore the properties to good repair and sound operating condition as promptly as is practicable. (Section 714)

Rates for Services

So long as any Secured Indebtedness is Outstanding, no free service related to the System shall be furnished by the Authority to any Local Body or to any person, firm, or corporation, except as set forth below. Any service rendered by the System to any Local Body or person, firm, or corporation shall be charged at the same rate and in the same manner in which any other user, within the same classification, is or would be charged for similar service. For purposes of this section, the Authority may make classifications among users of the System as permitted by the Act, which classifications may be based on reasonable distinctions related to the Authority's corporate purposes. The Authority may continue provisions for subsidization of water charges to which any Local Body is entitled in accordance with contract or other lawful obligations assumed by the Authority as successor to the MDC or otherwise entered into by the Authority prior to the adoption of the General Resolution. (Section 715)

Non-Payment of Rates; Certification to Commonwealth Treasurer

(a) The Authority may in its discretion determine when an overdue payment shall constitute a Local Body Default, and be so certified, until such time as any such payment shall have been overdue for twelve months, whereupon the Authority shall certify such default as a Local Body Default. The Authority may make, with respect to any moneys received from a Local Body, reasonable allocations between its charges to such Local Body for the provision of waterworks or sewer services. The Authority shall notify the Trustee within thirty (30) days of any overdue Payment that remains unpaid, of the existence of such overdue payment and shall promptly notify the Trustee upon the declaration of such default as a Local Body Default. Within five Business Days of the determination of a Local Body Default, the Authority shall send to each Local Body receiving waterworks services, if such default was with respect to waterworks services or sewer services, if such Default was with respect to sewer services from the Authority, including the defaulting Local Body, a notice, a copy of which shall be sent to the Trustee, specifying (i) that a Local Body Default has occurred; (ii) the amount of such Local Body Default; (iii) that unless such default is cured an allowance equal to such amount, including any interest or late charges on the overdue amount, shall be incorporated into the charges to each Local Body in connection with the Authority's next ensuing rate-setting process; and (iv) the approximate amount by which the Rates and Charges to be assessed against each Local Body shall be increased on account of the inclusion of such allowance in Rates and Charges. Further, the Authority shall by the earlier of (x) eighteen months from the date of such Local Body Default or (y) the next establishment by the Authority of its Rates and Charges following the Local Body Default which can feasibly incorporate the allowance referred to above, provided that the defaulting Local Body shall not have cured its default, assess each Local Body, including the

defaulting Local Body, a pro rata share, based on each Local Body's share of total charges for water and sewer services, respectively, of the amount of such Local Body Default, including any interest or charges on the overdue amount, which assessment shall be in addition to the Rates and Charges required to comply with the Rates and Charges covenants of the General Resolution. The Authority shall provide the Trustee with written evidence that such assessment has been made.

(b) In addition to the requirements described in paragraph (a) above, the Authority shall take such steps as may be necessary under the provisions of the Act to collect delinquent rates or charges, and to enforce liens for non-payment of rates or charges, in a practicable and timely manner. Without limiting the foregoing, in the event that any Local Body, which has received a certification of the Authority's charges, shall fail to pay the same to the Authority when due after demand by the Authority, the Authority shall promptly certify to the Treasurer and Receiver General of the Commonwealth the amount owing to the Authority by said Local Body in accordance with Section 10(b) of the Act. The Authority shall promptly certify its charges to each Local Body and, in the event of a Local Body's failure to pay the Authority's charges, shall promptly demand the payment of same. (Section 716)

Tax Covenants

The General Resolution includes several covenants by the Authority as to federal and state tax matters, including a general covenant to take, or require to be taken, such action as may from time to time be required to assure the continued exclusion from the federal gross income of holders of any Series of Tax Exempt Indebtedness and the continued exemption from Massachusetts income taxation of the interest on Indebtedness, including, without limitation, the preparation and filing of any statements required to be filed by the Authority in order to establish and maintain such tax exclusion and exemption. In addition, the Authority shall not take, or permit to be taken on its behalf, any action which would adversely affect the exclusion from federal gross income, or the exemption from Massachusetts income taxation, of the interest on any Series of Tax Exempt Indebtedness.

Notice to Rating Agencies of Certain Contracts

The Authority shall notify each Rating Agency, prior to executing any interest rate exchange, cap or other hedge agreement of the general terms of such agreement, whether payments under such agreement are payable as Special Payment Obligations or as Operating Expenses. (Section 512)

Supplemental Resolutions

Supplemental Resolutions Effective Upon Filing with Trustee

For any one or more of the following purposes and at any time or from time to time, a Supplemental Resolution may be adopted by the Authority, which upon the filing with the Trustee of a copy thereof certified by an Authorized Representative, shall be fully effective in accordance with its terms:

(a) to close the General Resolution against, or provide limitations and restrictions in addition to the limitations and restrictions contained in the General Resolution on, the authentication and delivery of Secured Bonds or the issuance of other Indebtedness;

(b) to add to the covenants and agreements of the Authority in the General Resolution other covenants and agreements to be observed by the Authority which are not contrary to or inconsistent with the General Resolution as theretofore in effect including any covenants necessary for compliance with the Code, including without limitation Section 148(f) thereof or regulations promulgated thereunder;

(c) to add to the limitations and restrictions in the General Resolution other limitations and restrictions to be observed by the Authority which are not contrary to or inconsistent with the General Resolution as theretofore in effect;

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(d) to surrender any right, power or privilege reserved to or conferred upon the Authority by the terms of the General Resolution, but only if the surrender of such right, power or privilege is not contrary to or inconsistent with the covenants and agreements of the Authority contained in the General Resolution;

(e) to authorize Secured Bonds of a Series and, in connection therewith specify and determine the matters and things referred to in the General Resolution with respect to conditions precedent to delivery of Secured Bonds, and also any other matters and things relative to such Secured Bonds which are not contrary to or inconsistent with the General Resolution as theretofore in effect, or to amend, modify or rescind any such authorization, specification or determination at any time prior to the first authentication and delivery of such Secured Bonds including, without limiting the generality of the foregoing, provisions amending or modifying the General Resolution to provide for the issuance of Secured Bonds in book-entry form or in coupon form payable to bearer;

(f) to confirm, as further assurance, any pledge under, and the subjection to any lien or pledge created or to be created by, the General Resolution, of the Revenues or of any other moneys, securities or funds;

(g) to modify the Primary Bond Coverage Ratio or the Supplemental Bond Coverage Ratio in accordance with the provisions of the General Resolution;

(h) to modify any of the provisions of the General Resolution in any respect whatsoever, provided that (i) such modification shall be, and be expressed to be, effective only after all Bonds or Subordinated Bonds of any Series affected by the amendment Outstanding at the date of the adoption of such Supplemental Resolution shall cease to be Outstanding, and (ii) such Supplemental Resolution shall be specifically referred to in the text of all Bonds or Subordinated Bonds of any Series authenticated and delivered after the date of the adoption of such Supplemental Resolution and of Bonds or Subordinated Bonds issued in exchange therefor or in place thereof;

(i) to modify the definition of Investment Securities as directed by the Authority's Board of Directors provided that the Authority shall have provided evidence to the Trustee that the details of such modification have been provided in writing to each Rating Agency then assigning a rating on Outstanding Secured Bonds and that each such Rating Agency has either (x) confirmed in writing that such modification will not adversely affect such ratings or (y) issued a rating on a Series of Bonds to be issued which is not lower than the rating assigned by such Rating Agency to Outstanding Bonds prior to such modification, or any other evidence satisfactory to the Trustee that modification will not adversely affect the then current ratings, if any, assigned to the Secured Bonds by any Rating Agency; or

(j) to subject to the General Resolution additional revenues, security or collateral. (Section 801)

Supplemental Resolutions Effective upon Consent of Trustee

(a) For any one or more of the following purposes and at any time or from time to time, a Supplemental Resolution may be adopted, which, upon (i) the filing with the Trustee of a copy thereof certified by an Authorized Representative, and (ii) the filing with the Authority of an instrument in writing made by the Trustee consenting thereto shall be fully effective in accordance with its terms:

(1) to cure any ambiguity, supply any omission, or cure or correct any defect or inconsistent provision in the General Resolution; or

(2) to insert such provisions clarifying matters or questions arising under the General Resolution as are necessary or desirable and are not contrary to or inconsistent with the General Resolution as theretofore in effect; or

(3) to provide for additional duties of the Trustee.

(b) Any such Supplemental Resolution may also contain one or more of the purposes permitted in Supplemental Resolutions that are effective upon filing with the Trustee, and in that event, the consent of the Trustee required as described under this heading shall be applicable only to those provisions of such Supplemental Resolution as shall contain one or more of the purposes set forth in paragraph (a) above. (Section 802)

Supplemental Resolutions Effective with Consent of Bondholders

At any time or from time to time, a Supplemental Resolution may be adopted subject to consent by holders of any Secured Bonds in accordance with and subject to the provisions of the General Resolution relating to amendments, which Supplemental Resolution, upon the filing with the Trustee of a copy thereof certified by an Authorized Representative and upon compliance with the provisions of the General Resolution, shall become fully effective in accordance with its terms as provided in the provisions of the General Resolution relating to amendments. (Section 803)

Amendments

Mailing of Notice of Amendment

Any provision in the General Resolution for the mailing of a notice or other paper to any holder of the Secured Bonds shall be fully complied with if it is mailed, by first-class mail, postage prepaid only (i) to each owner of Bonds or Subordinated Bonds, respectively, then Outstanding at his address appearing upon the registry books, and (ii) to the Trustee. (Section 901)

Powers of Amendment

Any modification or amendment of the General Resolution or of the rights and obligations of the Authority and of the holders of the Secured Bonds under the General Resolution, in any particular, may be made by a Supplemental Resolution, with the written consent given as provided in the General Resolution, (i) of the holders of at least two-thirds in principal amount of the Bonds Outstanding and two-thirds in principal amount of the Subordinated Bonds Outstanding at the time such consent is given and (ii) in case less than all of the several Series of Secured Bonds of then Outstanding are affected by the modification or amendment, of the holders of at least two-thirds in aggregate principal amount of the Secured Bonds the several Series so affected and Outstanding at the time such consent is given; provided, however, that if such modification or amendment will, by its terms, not take effect so long as any Secured Bonds of any specified like Series and maturity remain Outstanding, the consent of the holders of such Secured Bonds shall not be required and such Secured Bonds shall not be deemed to be Outstanding for the purpose of any calculation of Outstanding Secured Bonds as described in this paragraph. No such modification or amendment shall permit a change in the terms of redemption or maturity of the principal of any Outstanding Bond or Subordinated Bonds or of any installment of interest thereon or reduction in the principal amount or the Redemption Price thereof or in the rate of interest thereon without the consent of the holder of such Bond or Subordinated Bond, or shall reduce the percentages or otherwise affect the classes of Secured Bonds the consent of the holders of which is required to effect any such modification or amendment, or shall change or modify any of the rights or obligations of any Fiduciary without its written assent thereto. For the purposes of this paragraph, a Series shall be deemed to be affected by a modification or amendment of the General Resolution if the same adversely affects or diminishes the rights of the holders of Secured Bonds of such Series. The Trustee in its discretion may make a determination, binding on holders of Secured Bonds, as to whether any particular Series or maturity would be affected by any modification or amendment of the General Resolution. For the purposes of this paragraph, the holders of the Secured Bonds may include the initial holders thereof, regardless of whether such Secured Bonds are being held for immediate resale. (Section 902)

The Proposed Amendment would amend the first two sentences of the above paragraph to read as follows:

Any modification or amendment of the General Resolution of the rights and obligations of the Authority and of the holders of the Secured Bonds under the General Resolution, in any particular, may be made by a Supplemental Resolution, with the written consent given as provided in the General Resolution, (i) of the holders of at least 51% of the aggregate principal amount of the Bonds Outstanding at the time such consent is given and at least 51% of the aggregate principal amount of the Subordinated Bonds Outstanding at the time such consent is given and (ii) in case less than all of the several Series of Secured Bonds then Outstanding are affected by the modification or amendment, of the holders of at least 51% of the aggregate principal amount of the Secured Bonds of the several Series so affected Outstanding at the time such consent is given; provided, however, that if such modification or amendment will, by its terms, not take effect so long as any Secured Bonds of any specified like Series and maturity remain Outstanding, the consent of the holders

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of such Secured Bonds shall not be required and such Secured Bonds shall not be deemed to be Outstanding for the purpose of any calculation of Outstanding Secured Bonds under this section; and provided, further, that in connection with the initial issuance of a Series of Secured Bonds, the underwriters of such Series may give such consent with respect to such Series and such consent shall be binding upon all subsequent holders of such Series; and provided, further, that with respect to any Series of Secured Bonds which is secured by a Credit Facility that is not in default, the consent of the issuer of the Credit Facility shall be effective for the purposes of this sentence in place of the consent of the holders of the aggregate principal amount of the Secured Bonds of such Series Outstanding. No such modification or amendment shall permit a change in the terms of redemption or maturity of the principal of any Outstanding Bond or Subordinated Bond or of any installment of interest thereon or a reduction in the principal amount or the Redemption Price thereof or in the rate of interest thereon without the consent of the holder of such Bond or Subordinated Bond or shall reduce the percentages or otherwise change the classes of Secured Bonds the consent of the holders of (or of the issuers of Credit Facilities for) which is required to effect any such modification or amendment, or shall change or modify any of the rights or obligations of any Fiduciary without its written assent thereto.

Modifications by Unanimous Consent

Notwithstanding anything contained in the General Resolution with respect to Supplemental Resolutions and amendments, the terms and provisions of the General Resolution and the rights and obligations of the Authority and of the holders of Secured Bonds may be modified or amended in any respect upon the adopting and filing of a Supplemental Resolution and the consent of the holders of all Secured Bonds then Outstanding, such consent to be given as provided in the General Resolution except that no notice to the holders of Secured Bonds either by mailing or publication shall be required; but no such modification or amendment shall change or modify any of the rights or obligations of any Fiduciary without the filing with the Trustee of the written assent thereto of such Fiduciary in addition to the consent of the holders of Secured Bonds. (Section 904)

Events of Default

The occurrence of any one or more of the following events shall constitute an Event of Default under the General Resolution:

- (a) a default in the due and punctual payment of a Principal Installment or the Redemption Price of any Secured Bonds when and as the same shall become due and payable, whether at maturity or upon earlier redemption, or otherwise; or
- (b) a default in the due and punctual payment of any installment of interest on any Secured Bonds, when and as such interest installment shall become due and payable; or
- (c) default by the Authority in the performance or observance of any other of the covenants, agreements or conditions on its part or on the part of the Authority in the General Resolution, any Supplemental Resolution or in the Secured Bonds contained, and such default shall continue for a period of forty-five days after written notice thereof stating that such notice is a "Notice of Default" to the Authority by the Trustee or to the Authority and to the Trustee by the holders of not less than a majority in principal amount of the Secured Bonds Outstanding; provided that such forty-five day period shall be extended to such longer period of time as the Trustee may deem appropriate in the event of defaults which by their nature will require such longer period of time to cure if the Authority shall commence such cure within such forty-five day period and pursue the same diligently to completion; or
- (d) if the Authority (i) admits in writing its inability to pay its debts generally as they become due, (ii) commences voluntary proceeds in bankruptcy or seeking a composition of indebtedness, (iii) makes an assignment for the benefit of its creditors, (iv) consents to the appointment of a receiver of the whole or any substantial part of the System, or (v) consents to the assumption by any court of competent jurisdiction under any law for the relief of debtors of custody or control of the Authority or of the whole or any substantial part of the System.

Upon the happening and continuance of any Event of Default, the Trustee shall give notice of such occurrence to the registered holders of the Secured Bonds. Upon the happening and continuance of any Event of Default, the

Trustee may, and upon the written request of the holders of not less than a majority in principal amount of the Bonds Outstanding, or if no Bonds are Outstanding, Subordinated Bonds Outstanding, the Trustee shall, in any such case, unless the principal of all the Secured Bonds then Outstanding shall already have become due and payable, declare the principal of all Secured Bonds then Outstanding shall already have become due and payable immediately, and upon any declaration the same shall become and be immediately due and payable, anything in the General Resolution or in any of the Secured Bonds contained to the contrary notwithstanding. The right of the Trustee to make any such declaration as aforesaid, however, is subject to the condition that, if at any time after such declaration, but before the Secured Bonds shall have matured by their terms, all overdue installments of principal and interest upon the Secured Bonds, together with the reasonable and proper charges, expenses and liabilities of the Trustee, and all other sums then payable by the Authority under the General Resolution (except the interest accrued since the next preceding interest date on the Bonds due and payable solely by virtue of such declaration) shall either be paid by or for the account of the Authority or provision satisfactory to the Trustee shall be made for such payment, and all defaults under the Secured Bonds or under the General Resolution (other than the payment of principal and interest due and payable solely by reason of such declaration) shall be made good or be secured to the satisfaction of the Trustee or provision deemed by the Trustee to be adequate shall be made therefor, then and in every such case the holders of a majority in principal amount of the Bonds Outstanding, or if no Bonds are Outstanding, Subordinated Bonds Outstanding, by written notice to the Authority and to the Trustee, may rescind such declaration and annul such default in its entirety, or, if the Trustee shall have acted without a direction from the holders of the Secured Bonds as aforesaid at the time of such request, and if there shall not have been theretofore delivered to the Trustee written direction to the contrary by the holders of a majority in principal amount of the Bonds Outstanding or if no Bonds are Outstanding, Subordinated Bonds Outstanding, then any such declaration shall ipso facto be deemed to be rescinded and any such default and its consequences shall ipso facto be deemed to be annulled, but no such rescission and annulment shall extend to or affect any subsequent default or impair or exhaust any right or power consequent thereon. The Trustee shall not be liable for any decision made in good faith as to whether or not to declare all Secured Bonds to be due and payable. (Section 1001)

Application of Revenues and Other Moneys After Default

(a) The Authority covenants that if an Event of Default shall happen and shall not have been remedied, the Authority, upon demand of the Trustee, shall pay over or cause to be paid over to the Trustee (i) forthwith, any moneys, securities and funds then held by the Authority, or a Depository in any Fund, Account or Subaccount under the General Resolution and (ii) as promptly as practicable after receipt thereof, the Revenues.

(b) During the continuance of an Event of Default, the Trustee shall apply such Revenues and the income therefrom as follows and in the following order:

(1) to the payment of the reasonable and proper fees, charges and expenses (including reasonable attorneys' fees) of the Fiduciaries and of any engineer or firm of engineers or accountants or firm of accountants selected by the Trustee and to the payment of any fees and expenses required to keep any Financial Guaranties or Credit Facilities in full force and effect;

(2) to the payment of the amounts required for reasonable and necessary Operating Expenses, including reasonable and necessary reserves and working capital therefor, and for the reasonable repair and replacement of the System necessary to prevent loss of Revenues or to provide for the continued operation of the System, as certified to the Trustee by an independent engineer or firm of engineers of recognized standing (who may be an engineer or firm of engineers retained by the Authority for other purposes) selected by the Trustee;

(3) to the payment of the interest and principal or Redemption Price then due on the Bonds as follows:

(i) unless the principal of all of the Bonds shall be due and payable,

First: To the payment to the persons entitled thereto of all installments maturing, and, if the amount available shall not be sufficient to pay in full all installments maturing on the same date, then to the payment thereof ratably, according to the amounts

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due thereon, to the persons entitled thereto, without any discrimination or preference; and

Second: To the payment to the persons entitled thereto of the unpaid principal or Redemption Price of any Bonds which shall have become due, whether at maturity or by call for redemption, in the order of their due dates, and, if the amount available shall not be sufficient to pay in full all the Bonds due on any date, then to the payment thereof ratably, according to the amounts of principal or Redemption Price due on such date, to persons entitled thereto, without any discrimination or preference;

(ii) if the principal of all of the Bonds shall be due and payable, to the payment of the principal and interest then due and unpaid upon the Bonds without preference or priority of principal over interest or of interest over principal, or of any installment of interest over any other installment of interest, or of any Bond over any other Bond, ratably, according to the amounts due respectively for principal and interest, to the persons entitled thereto without any discrimination of preference;

(4) to the payment of the interest and principal or Redemption Price then due on the Subordinated Bonds in a manner similar to the payment of such amounts with respect to Bonds, as set forth above.

Any amounts on deposit in the Subordinated Debt Service Reserve Fund shall not be applied as set forth above to the payment of principal amount and interest on Bonds and any amounts on deposit in the Debt Service Fund and the Debt Service Reserve Fund shall not be applied as set forth above to the payment of the principal amount and interest on Subordinated Bonds.

(c) If and when all overdue installments of interest on all Secured Bonds, together with the reasonable and proper charges and expenses of the Trustee, and all other sums payable by the Authority under the General Resolution, including the principal and Redemption Price of and accrued unpaid interest on all Secured Bonds which shall then be payable by declaration or otherwise, shall either be paid by or for the account of the Authority, or provision satisfactory to the Trustee shall be made for such payment, and all defaults under the General Resolution or the Secured Bonds shall be made good or secured to the satisfaction of the Trustee or provision deemed by the Trustee to be adequate shall be made therefor, the Trustee shall pay over to the Authority all such Revenues then remaining unexpended in the hands of the Trustee (except Revenues deposited or pledged, or required by the terms of the General Resolution to be deposited or pledged, with the Trustee), and thereupon the Authority and the Trustee shall be restored, respectively, to their former position and rights under the General Resolution, and all Revenues shall thereafter be applied as provided in the General Resolution. (Section 1003)

Proceedings Brought by Trustee

(a) If an Event of Default shall happen and shall not have been remedied, then and in every such case, the Trustee, by its agents and attorneys, if the Trustee shall deem it advisable, may proceed to protect and enforce its rights and the rights of the holders of the Secured Bonds under the General Resolution forthwith by a suit or suits in equity or at law, whether for the specific performance of any covenant herein contained, or in aid of the execution of any power herein granted, or for an accounting against the Authority as if the Authority were the trustee of an express trust, or in the enforcement of any other legal or equitable right as the trustee, being advised by counsel, shall deem most effectual to enforce any of its rights or to perform any of its duties under the General Resolution.

(b) The holders of a majority in principal amount of the Bonds at the time Outstanding, or if no Bonds are Outstanding, of Subordinated Bonds Outstanding, may direct by instrument in writing the time, method and place of conducting any proceeding for any remedy available to the Trustee, or exercising any trust or power conferred upon the Trustee, provided that the Trustee shall have the right to decline to follow any such direction if the Trustee shall be advised by counsel that the action or proceeding so directed may not lawfully be taken, or if the Trustee in good faith shall determine that the action or proceeding so directed would involve the Trustee in personal liability or be unjustly prejudicial to the holders of Secured Bonds not parties to such direction.

(c) Upon commencing a suit in equity or upon the commencement of judicial proceedings by the Trustee to enforce any right under the General Resolution, the Trustee shall be entitled to exercise any and all rights and powers conferred in the General Resolution and provided to be exercised by the Trustee upon the occurrence of an Event of Default; and, as a matter of right against the Authority, without notice or demand and without regard to the adequacy of the security for the Secured Bonds, the Trustee shall, to the extent permitted by law, be entitled to the appointment of a receiver of the moneys, securities and funds then held by the Authority in any Fund, Account or Subaccount under the General Resolution and, subject to application of the Revenues, with all such powers as the court or courts making such appointment shall confer; but notwithstanding the appointment of any receiver, the Trustee shall be entitled to retain possession and control of and to collect and receive income from, any moneys, securities and funds deposited or pledged with it under the General Resolution or agreed to provide to be delivered or pledged with it under the General Resolution.

(d) Regardless of the happening of an Event of Default, the Trustee shall have the power to, but (unless requested in writing by the holders of a majority in principal amount of the Secured Bonds then Outstanding, and furnished with reasonable security and indemnity) shall be under no obligation to, institute and maintain such suits and proceedings, including, without limitation, proceedings for declaratory judgment or injunctive or other equitable relief, as it may determine shall be necessary or expedient to prevent any impairment of the security under the General Resolution, any impairment of the ability of the Authority or the Trustee to satisfy any of its agreements or obligations hereunder, or the impairment of any protection provided by the General Resolution of the interests of the holders of Secured Bonds by any acts which may be unlawful or in violation of the General Resolution, and such suits and proceedings, including, without limitation, proceedings for declaratory judgment or injunctive or other equitable relief, as the Trustee may determine shall be necessary or expedient to preserve or protect its interest and the interests of the holders of any Secured Bonds. (Section 1004)

Restrictions on Action by Holders of Secured Bonds

No holder of any Secured Bond shall have any right to institute any suit, action or proceeding at law or in equity for the enforcement of any provision of the General Resolution or the execution of any trust under the General Resolution or for any remedy under the General Resolution, unless such holder shall have previously given to the Trustee written notice of the happening of an Event of Default, as provided in the General Resolution, and the holders of at least a majority in principal amount of the Bonds then Outstanding, or if no Bonds are Outstanding of Subordinated Bonds Outstanding, shall have filed a written request with the Trustee, and shall have offered it reasonable opportunity, either to exercise the powers granted as provided under this heading or to institute such action, suit or proceeding in its own name, and unless such holders shall have offered to the Trustee adequate security and indemnity against the costs, expenses and liabilities to be incurred therein or thereby, and the Trustee shall have refused to comply with such request within a reasonable time; it being understood and intended that no one or more holders of Secured Bonds shall have any right in any manner whatever by his or their action to affect, disturb or prejudice the pledge created by the General Resolution, or to enforce any right under the General Resolution, except in the manner therein provided, and that all proceedings at law or in equity to enforce any provision of the General Resolution shall be instituted, had and maintained in the manner provided in the General Resolution and for the equal benefit of all holders of the Outstanding Bonds, in accordance with their rights and interests under the General Resolution and all holders of Outstanding Subordinated Bonds, in accordance with their rights and interests under the General Resolution. (Section 1005)

The Trustee

Resignation of Trustee

The Trustee may at any time resign and be discharged of the duties and obligations created by the General Resolution by giving not less than sixty days' written notice to the Authority and publishing notice thereof, at the Trustee's expense, specifying the date when such resignation shall take effect once in each week for two successive calendar weeks in an authorized newspaper, and such resignation shall take effect upon the day specified in such notice unless previously a successor shall have been appointed by the Authority or the holders of any Secured Bonds as provided in the General Resolutions, in which event such resignation shall take effect immediately on the appointment of such successor. (Section 1107)

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Removal of Trustee

The Trustee may be removed at any time by an instrument or concurrent instruments in writing, filed with the Trustee, and signed by the holders of a majority in principal amount of the Bonds then Outstanding, or if no Bonds are Outstanding, of the Subordinated Bonds then Outstanding, or their attorneys-in-fact duly authorized, excluding any Secured Bonds held by or for the account of the Authority. The Trustee may be removed at any time for any breach of trust or for acting or proceeding in violation of, or for failing to act or proceed in accordance with, any provision of the General Resolution with respect to the duties and obligations of the Trustee, by any court of competent jurisdiction upon the application of the Authority or the holders of not less than 25% in aggregate principal amount of Bonds Outstanding, or if no Bonds are Outstanding, Subordinated Bonds Outstanding, excluding any Secured Bonds held by or for the account of the Authority. Notwithstanding the foregoing provisions, at the end of the Fiscal Year of the Authority ending June 30, 2006, and at the end of every second Fiscal Year thereafter, the Authority may remove the Trustee, except during the existence of an Event of Default, upon one hundred twenty (120) days written notice to the Trustee by filing with the Trustee an instrument signed by an Authorized Representative of the Authority. (Section 1108)

Appointment of Successor Trustee

(a) In case at any time the Trustee shall resign or shall be removed or shall become incapable of acting, or shall be adjudged a bankrupt or insolvent, or if a receiver, liquidator or conservator of the Trustee, or its property, shall be appointed, or if any public offering shall take charge or control of the Trustee, or of its property or affairs, a successor may be appointed by the holder of a majority in principal amount of the Bonds then Outstanding, or if no Bonds are Outstanding of the Secured Bonds then Outstanding, excluding any Secured Bonds held by or for the account of the Authority, by an instrument or concurrent instruments in writing signed and acknowledged by such holders of any Secured Bonds or by their attorneys-in-fact duly authorized and delivered to such successor trustee, notification thereof being given to the Authority and the predecessor Trustee; but (unless a successor trustee shall have been appointed by the holders of the Secured Bonds as aforesaid) the Authority by a duly executed written instrument signed by an Authorized Representative shall forthwith appoint a Trustee to fill such vacancy until a successor Trustee shall be appointed by the holders of the Secured Bonds as authorized in the General Resolution. The Authority shall publish notice of any such appointment made by it once in each week for two consecutive calendar weeks, in an authorized newspaper, the first publication to be made within 20 days after such appointment. Any successor Trustee appointed by the Authority shall, immediately and without further act, be superseded by a Trustee appointed by the holders of the Secured Bonds as authorized in the General Resolution.

(b) If in a proper case no appointment of a successor trustee shall be made pursuant to the foregoing provisions of the General Resolution within forty-five days after the Trustee shall have given to the Authority written notice as provided in the General Resolution or after a vacancy in the office of the Trustee shall have occurred by reason of its inability to act, the Trustee or the holder of any Secured Bond may apply to any court of competent jurisdiction to appoint a successor trustee. Said court may thereupon, after such notice, if any, as such court may deem proper and prescribe, appoint a successor trustee.

(c) Any Trustee appointed under the provisions of the General Resolution in succession to the Trustee shall be a bank or trust company organized under the laws of any state of a national banking association, and having a capital and surplus aggregating at least \$100,000,000, if there be such a bank or trust company or national banking association willing and able to accept the office on reasonable and customary terms and authorized by law to perform all the duties imposed upon it by the General Resolution. (Section 1109)

Defeasance

(a) If the Authority shall pay or cause to be paid to the holders of all Secured Bonds then Outstanding, the Principal Installments and interest and Redemption Price, if any, to become due thereon, at the times and in the manner stipulated therein and in the General Resolution, then, at the option of the Authority, expressed in an instrument in writing signed by an Authorized Representative and delivered to the trustee, the covenants, agreements and other obligations of the Authority to the holders of such Secured Bonds shall be discharged and satisfied. In such event, the Trustee shall, upon the request of the Authority, execute and deliver to the Authority all such instruments as may be desirable to evidence such discharge and satisfaction and the Fiduciaries shall pay over or deliver to the

Authority all moneys, securities and funds held by them pursuant to the General Resolution which are not required for the payment or redemption of Secured Bonds not theretofore surrendered for such payment or redemption.

(b) Secured Bonds for the payment or redemption of which moneys shall have been set aside and shall be held in trust by the Trustee (through deposit by the Authority of funds for such payment or redemption or otherwise) at the maturity or redemption date thereof shall be deemed to have been paid within the meaning and with the effect expressed in (a) above. Subject to the provisions described in paragraph (c) below, any Outstanding Secured Bonds shall prior to the maturity or redemption date thereof be deemed to have been paid within the meaning and with the effect expressed in paragraph (a) above if (i) in case any of said Secured Bonds are to be redeemed on any date prior to the maturity, the Authority shall have given to the Trustee irrevocable instructions accepted in writing by the Trustee to publish as provided in the General Resolution notice of redemption of such Secured Bonds (other than the Secured Bonds which have been purchased by the Trustee at the direction of the Authority as hereinafter provided prior to the publication of such notice of redemption) on said date, (ii) there shall have been deposited with the Trustee either moneys in an amount which shall be sufficient, or Defeasance Obligations the principal installments of and/or the interest on which when due, without reinvestment, will provide moneys which, together with the moneys, if any, deposited with the Trustee at the same, time, shall be sufficient, to pay when due the Principal Installments or Redemption Price, if applicable, and interest due and to become due on said Secured Bonds on or prior to the redemption date or maturity date thereof, as the case may be, and (iii) in the event said Secured Bonds are not to be redeemed within the next succeeding 60 days, the Authority shall have given the Trustee in form satisfactory to it irrevocable instructions to publish, as soon as practicable, at least twice, at an interval of not less than seven days between publications, in the authorized newspapers a notice to the holders of such Secured Bonds that the deposit referred to in clause (i) above has been made with the Trustee and that said Secured Bonds are deemed to have been paid as provided under this heading and stating such maturity or redemption date upon which moneys are to be available for the payment of the Principal Installments or Redemption Price, if applicable, on said Secured Bonds (other than Secured Bonds which have been purchased by the Trustee at the direction of the Authority as hereinafter provided prior to the publication of the notice of redemption referred to in clause (i)); provided, however, that in connection with the provision for payment of any Secured Bonds which are then in non-certificated form, the requirements of clause (iii) above shall be deemed satisfied upon mailing of the notice required by said clause (iii) by registered mail to the securities depository which is the registered owner, or whose nominee is the registered owner, of such Secured Bonds. The Trustee shall, as and to the extent necessary, apply moneys held by it as provided under this heading to the retirement of said Secured Bonds in amounts equal to the unsatisfied balances of any Sinking Fund Installments with respect to such Secured Bonds, all in the manner provided in the General Provisions.

The Trustee shall, if so directed by the Authority (x) prior to the maturity date of Secured Bonds deemed to have been paid as provided under this heading which are not to be redeemed prior to the maturity date or (y) prior to the publication of the notice of redemption referred to in clause (i) above with respect to any Secured Bonds deemed to have been paid as provided under this heading which are to be redeemed on any date prior to their maturity, apply moneys deposited with the Trustee in respect of such Secured Bonds and redeem or sell Defeasance Obligations so deposited with the Trustee and apply the proceeds thereof to the purchaser of such Secured Bonds and the Trustee shall immediately thereafter cancel all such Secured Bonds so purchased; provided, however, that the Trustee shall receive a certificate of the Accountant showing that the moneys and Defeasance Obligations remaining on deposit with the Trustee after the purchase and cancellation of such Secured Bonds shall be sufficient to pay when due the Principal Installment or Redemption Price, if applicable, and interest due or to become due on all Secured Bonds, in respect of which such moneys and Defeasance Obligations are being held by the Trustee on or prior to the redemption date or maturity date thereof, as the case may be, and a Bond Counsel's opinion to the effect that such redemption or sale of such Defeasance Obligations will not adversely affect the exclusion of the interest on such Secured Bonds from gross income of the holders thereof for federal income tax purposes and that such redemption or sale otherwise complies with the provisions of the General Resolution. Except as otherwise described in paragraphs (b) and (c) under this heading, neither Defeasance Obligations nor moneys deposited with the Trustee as described under this heading nor principal or interest payments on any such Defeasance Obligations shall be withdrawn or used for any purpose other than, but shall be held in trust for, the payment of the principal or Redemption Price, if applicable, and interest on said Secured Bonds; provided that any cash received from such principal or interest payments on such Defeasance Obligations deposited with the Trustee (A) to the extent such cash will not be required at any time for such purpose, shall be paid over to the Authority as received by the Trustee, free and clear of any trust, lien or pledged securing said Secured Bonds other otherwise existing under the General Resolution, and (B) to the extent such cash will be required for such purpose at a later date, shall, to the extent practicable, be reinvested at the written direction of an Authorized

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Representative of the Authority in Defeasance Obligations maturing at times and in amounts sufficient to pay when due the principal or Redemption Price, if applicable, and interest to become due on said Secured Bonds on or prior to such redemption date or maturity date thereof, as the case may be, and interest earned from such reinvestment, shall be paid over to the Authority, as received by the Trustee free and clear of any lien or pledge securing said Secured Bonds or otherwise existing under the General Resolution.

(c) For purposes of determining whether Variable Rate Indebtedness shall be deemed to have been paid prior to the maturity or redemption date thereof, as the case may be, by the deposit of moneys, or Defeasance Obligations and moneys, if any, in accordance with the second sentence of paragraph (b) under this heading, the interest to come due on such Variable Rate Indebtedness on or prior to the maturity date or redemption date thereof, as the case may be, shall be calculated at the maximum rate permitted by the terms thereof; provided, however, that if on any date, as a result of such Variable Rate Indebtedness having borne interest at less than such maximum rate for any period, the total amount of moneys and Investment securities on deposit with the Trustee for the payment of interest on such Variable Rate Indebtedness is in excess of the total amount which would have been required to be deposited with the Trustee on such date in respect of such Variable Rate Indebtedness in order to satisfy the provisions described in the second sentence of paragraph (b) under this heading, the Trustee shall, if requested, by the Authority, pay the amount of such excess to the Authority free and clear of any lien or pledge securing the Secured Bonds or otherwise existing under the General Resolution.

(d) Option Bonds shall be deemed to have been paid in accordance with the provisions described in the second sentence of paragraph (b) under this heading, only if, in addition to satisfying the requirements of clauses (i) and (iii) of such sentence, there shall have been deposited with the Trustee moneys in an amount which shall be sufficient to pay when due the maximum amount of principal of and premium, if any, and interest on such Bonds which could become payable to the holders of such Option Bonds upon the exercise of any options provided to the holders of such Option Bonds; provided, however, that if, at the time a deposit is made with the Trustee pursuant to the provisions described in paragraph (b) under this heading, the options originally exercisable by the holder of an Option Bond are no longer exercisable, such Option Bond shall not be considered an Option Bond for purposes of this paragraph. If any portion of the moneys deposited with the Trustee for the payment of the principal of and premium, if any, and interest on Option Bonds is not required for such purpose the Trustee shall, if requested by the Authority, pay the amount of such excess to the Authority free and clear of any trust, lien or pledge securing said Option Bonds or otherwise existing under the General Resolution.

(e) Anything in the General Resolution to the contrary notwithstanding, any moneys held by a Fiduciary in trust for the payment and discharge of any of the Secured Bonds which remain unclaimed for two years after the date when such Secured Bonds have become due and payable, either at their stated maturity dates or by call for earlier redemption, if such moneys were held by the Fiduciary at such date, or for two years after the date of deposit of such moneys if deposited with the Fiduciary after the said date when such Secured Bonds become due and payable, shall, at the written request of the Authority, be repaid by the Fiduciary to the Authority, as its absolute property and free from trust, and the Fiduciary shall thereupon be released and discharged with respect thereto and the holders of any Secured Bonds shall look only to the Authority for the payment of such Secured Bonds; provided, however, that before being required to make any such payment to the Authority, the Fiduciary may, at the expense of the Authority, cause to be published at least twice, at an interval of not less than seven days between publications, in an authorized newspaper, a notice that said moneys remain unclaimed and that, after a date named in said notice, which date shall be not less than 30 days after the date of the first publication of such notice, the balance of such moneys then unclaimed will be returned to the Authority. (Section 1201)

Preservation and Inspection of Documents

All documents received by an Fiduciary under the provisions of the General Resolution shall be retained in its possession and shall be subject at all reasonable times to the inspection of the Authority, any other Fiduciary, and any holder of any Secured Bonds and any person that the Trustee can reasonably determine is a beneficial owner of any Secured Bonds held by or on behalf of a securities depository, and their agents and their representatives, any of whom may make copies thereof. Upon the receipt of a written request by any such beneficial owner or any holder of any Secured Bonds, or their agents or their representatives, the Trustee shall provide copies of any reports or certificates delivered to the Trustee pursuant to any provision of the General Resolution. At the direction of the

Authority, the Trustee shall require the party requesting such reports or certificates to pay or reimburse the Trustee for the direct costs of reproducing and mailing such reports or certificates. (Section 1204)

No Recourse on the Secured Bonds

No recourse shall be had for the payment of the principal of or interest on the Secured Bonds or for any claim based thereon or on the General Resolution against any member or officer of the Authority or any person executing the Secured Bonds. (Section 1206)

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[DATE OF ISSUANCE]

Massachusetts Water Resources Authority
Charlestown Navy Yard
100 First Avenue
Boston, Massachusetts 02129

Re: \$125,000,000 Massachusetts Water Resources Authority General Revenue Bonds, 2019 Series B and \$19,190,000 Massachusetts Water Resources Authority General Revenue Refunding Bonds, 2019 Series C (Green Bonds) (together, the "Bonds")

Ladies and Gentlemen:

We have acted as Bond Counsel to the Massachusetts Water Resources Authority (the "Authority") in connection with the authorization, sale, issuance and delivery of the above-captioned Bonds. In that capacity, we have examined the provisions of Chapter 372 of the Acts of 1984 of The Commonwealth of Massachusetts, as amended (the "Act"), the Authority's Amended and Restated General Revenue Bond Resolution effective on April 23, 2015, as amended and supplemented to date (the "General Resolution"), the Eightieth Supplemental Resolution Authorizing the Issuance of up to \$166,000,000 Massachusetts Water Resources Authority General Revenue Bonds, 2019 Series B and General Revenue Refunding Bonds, 2019 Series C (Green Bonds) adopted on February 20, 2019 (the "Supplemental Resolution"), and the Issuance Resolution of the Authority adopted on February 20, 2019 (the "Issuance Resolution," and together with the General Resolution and the Supplemental Resolution, the "Resolutions"), and we have examined and are familiar with originals or copies, certified or otherwise identified to our satisfaction, of such records of the Authority, certificates of officers of the Authority and other documents and instruments, and have made such other investigation of facts and examination of Massachusetts and federal law, as we have deemed necessary or proper for the purpose of rendering this opinion. We also have examined a record of proceedings relating to the authorization, sale, issuance and delivery of the Bonds and copies identified to our satisfaction of one Bond of each series and each maturity as executed. Capitalized terms used herein shall, unless otherwise specified, have the meanings set forth in the Resolutions.

The Bonds are being issued by means of a book-entry system, with bond certificates immobilized at or on behalf of The Depository Trust Company, New York, New York ("DTC"), and not available for distribution to the public, evidencing ownership of the Bonds in Authorized Denominations with transfer of beneficial ownership effected on the records of DTC and its participants pursuant to rules and procedures established by DTC and its participants.

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APPENDIX D

Massachusetts Water Resources Authority
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Based upon our examination, we are of the following opinion:

- (a) The Authority is duly organized and validly existing under the Act as a body politic and corporate and a public instrumentality of The Commonwealth of Massachusetts, with the right and power under the Act to adopt the Resolutions, perform the agreements on its part contained therein and issue the Bonds.
- (b) The Bonds are general obligations of the Authority secured by the Resolutions and a pledge of the Revenues received by or for the account of the Authority and moneys on deposit in the funds and accounts pledged as security therefor under the Resolutions, and the Resolutions create the valid pledge and lien which they purport to create for the benefit of the holders of the Bonds, subject to the application of such pledged Revenues and moneys to the purposes and on the conditions permitted by the Resolutions.
- (c) The Bonds have been duly authorized, executed, authenticated and delivered and all conditions required by the Resolutions precedent to the issuance of the Bonds have been met. The Bonds are valid and binding general obligations of the Authority enforceable in accordance with their terms and entitled to the benefits and security of the Resolutions, subject only to applicable bankruptcy, insolvency, moratorium, reorganization or other laws affecting creditors' rights heretofore or hereafter enacted and to general equity principles.
- (d) The Resolutions have been duly and lawfully adopted by the Authority, are in full force and effect and are valid and binding agreements of the Authority enforceable in accordance with their respective terms, subject only to applicable bankruptcy, insolvency, moratorium, reorganization or other laws affecting creditors' rights heretofore or hereafter enacted and to general equity principles.
- (e) Under existing law, interest on the Bonds will not be included in gross income of holders of the Bonds for federal income tax purposes. This opinion is rendered subject to compliance by the Authority, subsequent to the issuance of the Bonds, with various requirements of the Internal Revenue Code of 1986, as amended. Failure to comply with such requirements could cause interest on the Bonds to become subject to federal income taxation retroactive to the date of issuance of the Bonds. Interest on the Bonds will not constitute an item of tax preference for purposes of computing the alternative minimum tax imposed on individuals. We express no opinion as to any other federal tax consequences or other federal tax matters with respect to the Bonds.
- (f) The Bonds, their transfer and the income therefrom, including any profit made on the sale thereof, are exempt from taxes imposed by existing Massachusetts

Massachusetts Water Resources Authority
[DATE OF ISSUANCE]
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laws, although the Bonds and the interest thereon may be included in the measure of estate and inheritance taxes and of certain corporation excise and franchise taxes. We express no opinion as to the taxability of the Bonds, their transfer and the income therefrom, including any profit made on the sale thereof, under the laws of states other than Massachusetts.

This opinion is expressed as of the date hereof, and we neither assume nor undertake any obligation to update, revise, supplement or restate this opinion to reflect any action taken or omitted, or any facts or circumstances or changes in law or in the interpretation thereof, that may hereafter arise or occur, or for any other reason.

This opinion is limited to the matters expressly set forth herein and no opinion is implied or may be inferred beyond the matters expressly stated herein. Copies of this opinion may not be delivered to and may not be relied upon by any other party without our express prior written consent.

Very truly yours,

McCarter & English, LLP

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TABLE OF REFUNDED BONDS

Bonds	CUSIP	Maturity Date (August 1)	Original Principal Amount	Principal Amount Redeemed	Interest Rate	Redemption Date	Redemption Price
General Revenue Refunding Bonds, 2009 Series B	576051TU0	2021	\$44,515,000	\$12,120,000	5.0%	08/01/19	100%
	576051TV8	2022	\$39,315,000	\$8,220,000	5.0%	08/01/19	100%

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DESCRIPTION OF GREEN BONDS PROJECTS

WASTEWATER PROJECTS

Interception and Pumping	Construction and replacement of trunk and relief sewers. Construction and rehabilitation of pump stations in MWRA's north and south systems.
Treatment and Residuals	Deer Island Wastewater Treatment Plant Project: construction of primary and secondary treatment facilities; ancillary modifications and asset protection of the DITP. Rebuilding of Clinton Wastewater Treatment Plant.
Combined Sewer Overflows	Construction of and improvements to CSO treatment facilities, sewer separation projects and a CSO storage tunnel to improve water quality in Boston Harbor, Dorchester Bay, the Charles, Mystic and Neponset Rivers, and Alewife Brook.

WATERWORKS PROJECTS

Drinking Water Quality Improvements	Construction and asset protection of John J. Carroll Water Treatment Plant to provide disinfection and corrosion control to the drinking water supplied to the Authority's metropolitan waterworks system. Construction of the William A. Brutsch Water Treatment Plant to provide disinfection to the communities serviced by the Chicopee Valley Aqueduct.
Transmission System	Construction and rehabilitation of aqueducts, including the MetroWest Water Supply Tunnel and the Hultman Aqueduct. Construction and replacement of water supply, connecting and distribution mains.
Distribution and Pumping	Construction and rehabilitation of water pump stations. Construction of covered storage facilities to eliminate the use of open reservoirs.

