# Executive Summary

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# MWRA AT A GLANCE

**Purpose**

Provide wholesale water and sewer services to customer communities, funded primarily through rates and charges

**Legal Status**

Massachusetts public authority established by an enabling act in 1984 – Chapter 372 of the Acts of 1984 as most recently amended January 2017

**Management**

- 11-member Board of Directors (3 Governor appointees, 3 Mayor of Boston appointees, 1 City of Quincy appointee, 1 Town of Winthrop appointee, and 3 Advisory Board appointees)
- 1 Executive Director (5 divisions: Office of the Executive Director, Operations, Finance, Administration, Law)

**Advisory Board**

Established by the enabling act to make recommendations to the MWRA on the MWRA budget and programs and to serve as liaison to the customer communities

**Service Area**

- 61 customer communities (43 sewerage, 51 water)
- 3.0 million people (44% of MA population)
- 5,500 businesses

**FY18 Operating Budget ($ in millions)**

| | |
|---|---|
| Direct Expenses | $232.6 |
| Indirect Expenses | $38.9 |
| Capital Finance | $472.2 |
| Total Operating Budget | $743.6 |
| Revenues* | $743.6 |

**96.4% of Revenues raised from rate assessments*

**Bond Ratings - General Revenue Bonds (senior/subordinate)**

| | |
|---|---|
| Moody's - | Aa1/Aa2 |
| S&P - | AA+/AA |
| Fitch - | AA+/AA |

**Capital Improvement Program**

- Total CIP spending: $8.3 billion since 1984
- Total Current Indebtedness $5.2 billion
- FY18 CIP Budget: $174.9 million

**Water System**

- 2 protected reservoirs
  - Quabbin
  - Wachusett
- 2 water treatment facilities
  - John J. Carroll
  - William A. Brutsch
- 350 miles of distribution infrastructure including aqueducts, deep rock tunnels, and pipeline
- 12 active storage reservoirs and standpipes
- 11 active pumping stations
- Average Daily flow: 200 mgd
- Safe yield: 300 mgd
- Treatment Capacity: 405 mgd
- Percentage of capacity utilized: 67%*

  **based on safe yield*

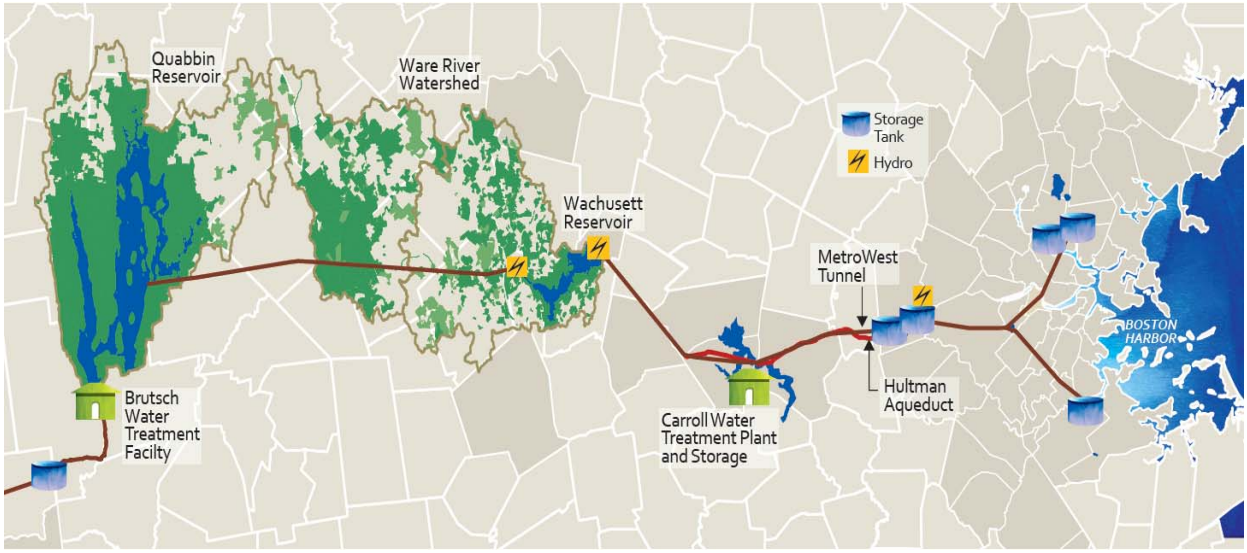
**Wastewater System**

- 240 miles of sewer pipelines and cross-harbor tunnels
- 11 pump stations
- 1 screening facility
- 4 CSO treatment/storage facilities
- 2 wastewater treatment plants
  - Deer Island Treatment Plant
  - Clinton Advanced Wastewater Treatment Plant
- 5 remote headworks
- 1 Pellet Plant for residuals processing
- Average daily flow: 365 mgd
- Peak wet weather capacity: 1,270 mgd
- Percentage of capacity utilized on average: 30%

**Renewable Energy**

28% of MWRA's energy requirement was self-generated from renewable sources (biomass, hydro, wind, & solar assets) in FY17.

# MWRA AT A GLANCE




MWRA's water comes from the Quabbin Reservoir, 65 miles west of Boston, and the Wachusett Reservoir, 35 miles west of Boston. The Quabbin alone holds a 4-year supply of water.

The reservoirs are filled naturally. Rain and snow fall onto watersheds (protected land around the reservoirs) and eventually turn into streams that flow into the reservoirs. This water comes into contact with soil, rock, plants and other material as it follows its path. This process helps to clean the water.

The Quabbin and Wachusett Reservoirs are protected. Over 85% of the watershed lands that surround the reservoirs are covered in forest and wetlands. About 75% of the total watershed land cannot be built on. The natural undeveloped watersheds help to keep MWRA water clean and clear. Because they are well-protected, the water in the Quabbin and Wachusett Reservoirs is of very high quality. The MWRA has won numerous awards for quality, taste, and sustainability.

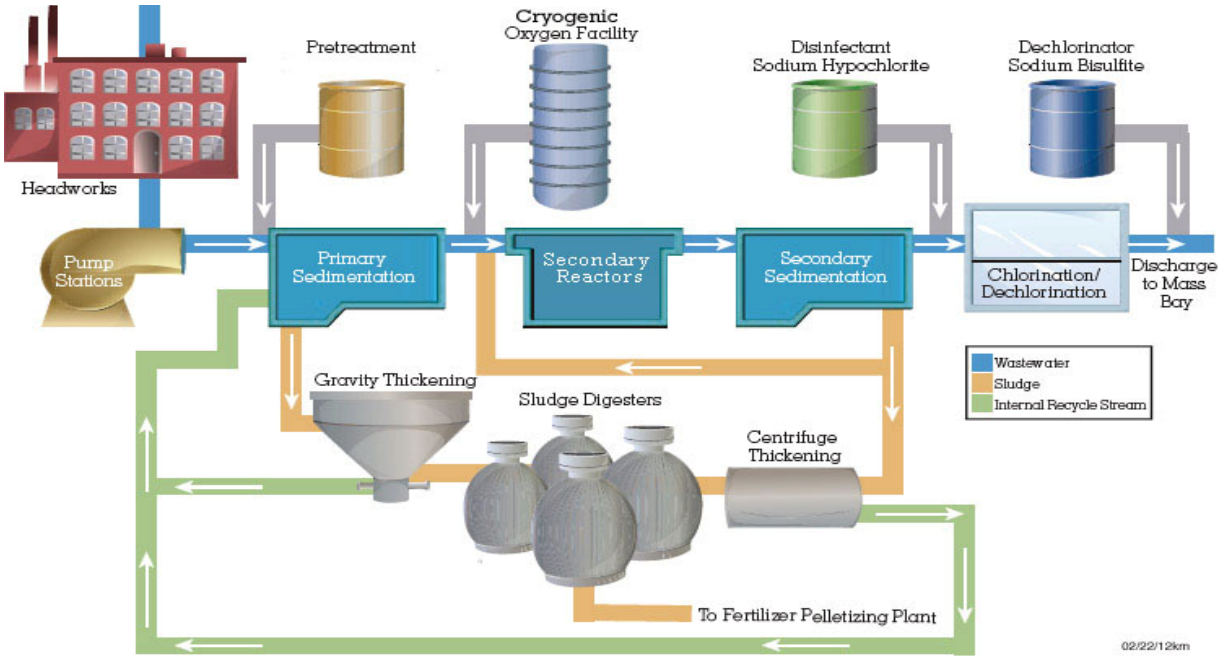
Water for most MWRA communities is treated at the Carroll Water Treatment Plant in Marlborough, Massachusetts. Water from the Quabbin and Wachusett Reservoirs enters the plant through the Cosgrove or Wachusett Aqueduct. The treated water leaves the plant through the MetroWest Water Supply Tunnel and the Hultman Aqueduct. Water from the Quabbin Reservoir for Chicopee, South Hadley Fire District #1 and Wilbraham is treated at the Brutsch Water Treatment Facility in Ware, Massachusetts, and leaves the plant through the Chicopee Valley Aqueduct.

For MetroWest and Metro Boston communities**,** treated water is sent through the MetroWest Water Supply Tunnel and the Hultman Aqueduct and is stored in covered tanks. From there it is drawn into distribution mains and many smaller community pipes. For Chicopee Valley Area Communities, treated water is sent through the Chicopee Valley Aqueduct to the local distribution mains and smaller community pipes. Water meters log the water entering each community.

Local pipes serve each street in the customer communities and eventually carry water into buildings. Meters installed by the local communities measure the amount of water delivered to each home or business.

To maintain and measure water quality, MWRA tests over 1,600 water samples per month, from the reservoirs all the way to household taps.

# MWRA AT A GLANCE – Wastewater System




Water is flushed through a building's pipes into customer community sewers. These 5,100 miles of local sewers transport the wastewater into 227 miles of MWRA interceptor sewers. The interceptor sewers, ranging from 8 inches to 11 feet in diameter, carry the region's wastewater to two MWRA treatment plants. Most communities' wastewater flows to the Deer Island Treatment Plant with the Clinton Wastewater Treatment Plant serving the town of Clinton and the Lancaster Sewer District.

The following describes the Deer Island treatment process:

Collection and Pumping: Sewage is piped to headworks where bricks, logs and other large objects are screened out. Pumps draw the screened sewage through deep-rock tunnels under Boston Harbor to Deer Island.

Preliminary Treatment: Mud and sand settle in a tank called a grit chamber. This material, known as grit and screenings, is taken to a landfill for environmentally safe disposal.

Primary Treatment: The sewage then flows to primary settling tanks where up to 60% of the solids in the waste stream settle out as a mixture of sludge and water.

Secondary Treatment: Plant oxygen is added to the wastewater to speed up the growth of micro-organisms. These microbes then consume the wastes and settle to the bottom of the secondary settling tanks. After secondary treatment, 80-90% of human waste and other solids have been removed.

The treated wastewater is disinfected before it is discharged to the Massachusetts Bay. The treated wastewater, known as effluent, travels through a 9.5-mile Outfall Tunnel bored through solid rock more than 250 feet below the ocean floor. The tunnel's last mile and a quarter include 55 separate release points known as "diffusers." With water depths up to 120 feet, this outfall provides a much higher rate of mixing and/or dilution than possible with discharges into the shallow waters of Boston Harbor.

Sludge from primary and secondary treatment is processed further in sludge digesters, where it is mixed and heated to reduce its volume and kill disease-causing bacteria. It is then transported through the Inter-Island Tunnel to the pelletizing plant in Quincy, Massachusetts where it is dewatered, heat-dried and converted to a pellet fertilizer for use in agriculture, forestry and land reclamation.

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## MWRA Capital Improvement Program Overview

In 1984, legislation was enacted to create the Massachusetts Water Resources Authority, an independent agency with the ability to raise its revenues from ratepayers, bond sales and grants. The primary mission was to modernize the area's water and sewer systems and clean up Boston Harbor. Since its establishment, the MWRA has invested over $8.3 billion to improve the wastewater and waterworks systems serving its 61 customer communities. The system serves 3.0 million people and more than 5,500 businesses.

Since 1985, MWRA has been subject to a Clean Water Act enforcement action to end years of wastewater pollution of Boston Harbor and its tributaries from the old Deer Island and Nut Island treatment plants and combined sewer overflows (CSOs). The enforcement case was initiated by the Conservation Law Foundation in 1983 and taken up by the U.S. Environmental Protection Agency in 1985. The Commonwealth of Massachusetts, the Boston Water and Sewer Commission, the City of Quincy and the Town of Winthrop are also parties to the case.

The Orders of the Court set forth the schedules of activities to be undertaken to achieve compliance with the law. Since 1985, MWRA has complied with 420 milestones which include the completion of extensive new wastewater treatment facilities at Deer Island in Boston and Nut Island in Quincy, a residuals facility in Quincy, and 35 CSO control projects in Boston, Cambridge, Chelsea and Somerville which comprise the long-term CSO control plan, the last of which were completed in December 2015.

As part of compliance with the Court's Orders, MWRA was required to file monthly compliance and progress reports on its ongoing activities thru December 15, 2000 and quarterly compliance and progress reports thru December 2016. MWRA is currently required to submit bi-annual compliance and progress reports through December 2020.

During the same time, MWRA also complied with regulatory mandates to improve waterworks facilities. The mandated waterworks projects included the MetroWest Water Supply Tunnel, the Carroll Water Treatment Plant, and several covered water storage facilities.

The mandated projects account for most of the Capital Improvement Program (CIP) spending. The five initiatives below account for over $6.0 billion or 74% of spending to date:

- Boston Harbor Project - $3.8 billion
- Combined Sewer Overflow - $908 million
- MetroWest Tunnel - $697 million
- Carroll Water Treatment Plant - $419 million
- Covered Storage Facilities - $239 million

As the MWRA reaches maturity as an agency, the infrastructure modernization and new facilities construction phase is nearing completion, and, barring new mandates, most of the Authority's

future capital budget will be designated for Asset Protection, Water System Redundancy, Pipeline Replacement and Rehabilitation, and Business System Support.

Asset Protection focuses on the preservation of the Authority's capital assets. Water System Redundancy aims to reduce the risks of service interruption and allow for planned maintenance of the water system assets. Long-term water redundancy will be the largest future CIP initiative with estimated spending in excess of $1.4 billion over 17 years. Pipeline Replacement and Rehabilitation focuses on the maintenance and replacement of water and sewer pipelines. Business System Support provides for the continuing improvement and modernization of technology and security systems.

The FY19 Proposed CIP reaffirms MWRA's commitment to the community financial assistance programs on both the water and wastewater side and includes the addition of Phases 11 and 12 of the Infiltration/Inflow (I/I) Program with funding of $120.0 million.

Capital initiatives to date have been primarily funded through long-term borrowings, and the debt service on these outstanding bonds represents a significant and growing portion of the Authority's operating budget. As of June 30, 2017, MWRA's total debt was $5.2 billion. The Authority's debt service obligation as a percent of total expenses has increased from 36% in 1990 to 63.5% in the Final FY18 Current Expense Budget.

The MWRA's credit ratings of Aa1 from Moody's, AA+ from S&P, and AA+ from Fitch, reflect strong management of financial performance, application of operating surpluses to early debt defeasance, satisfactory debt service coverage ratios, well maintained facilities, comprehensive long-term planning of both operating and capital needs, and the strong credit quality of its member service communities.

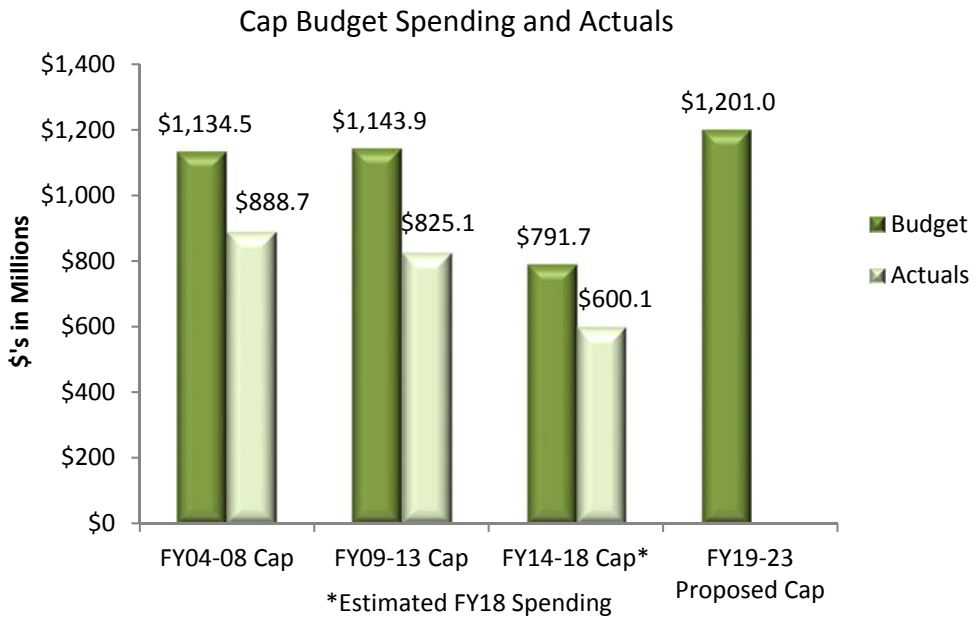
The development of the FY19 Proposed CIP presented added challenges as staff not only established the FY19 Proposed CIP, but set forth the five-year spending Cap for FY19-23 as well. FY19-23 will be the third five-year spending Cap since first introduced for the first time in 2003 to cover the FY04-08 period. The spending Cap represents targeted spending levels to ensure adequate capital funding while balancing the need for reasonable and predictable community assessments.

To arrive at the FY19 Proposed CIP and the FY19-23 spending Cap, the Authority identified the needs of the programs taking into account the recommendations of the Master Plan. The long-term strategy for capital work is identified in the Authority's Master Plan which was published in 2006, updated in 2013, and is currently being updated. The Master Plan serves as a road map for inclusion of projects in the CIP in every budget cycle.

The FY19 Proposed CIP represents an update to the FY18 CIP approved by the MWRA Board in June 2017. The spending projections put forth are the result of prioritizing the projects, establishing realistic estimates based on the latest information, striking a balance between maintenance and infrastructure improvements, and ensuring that there is adequate support for MWRA's core operations to meet all regulatory operating permit requirements.

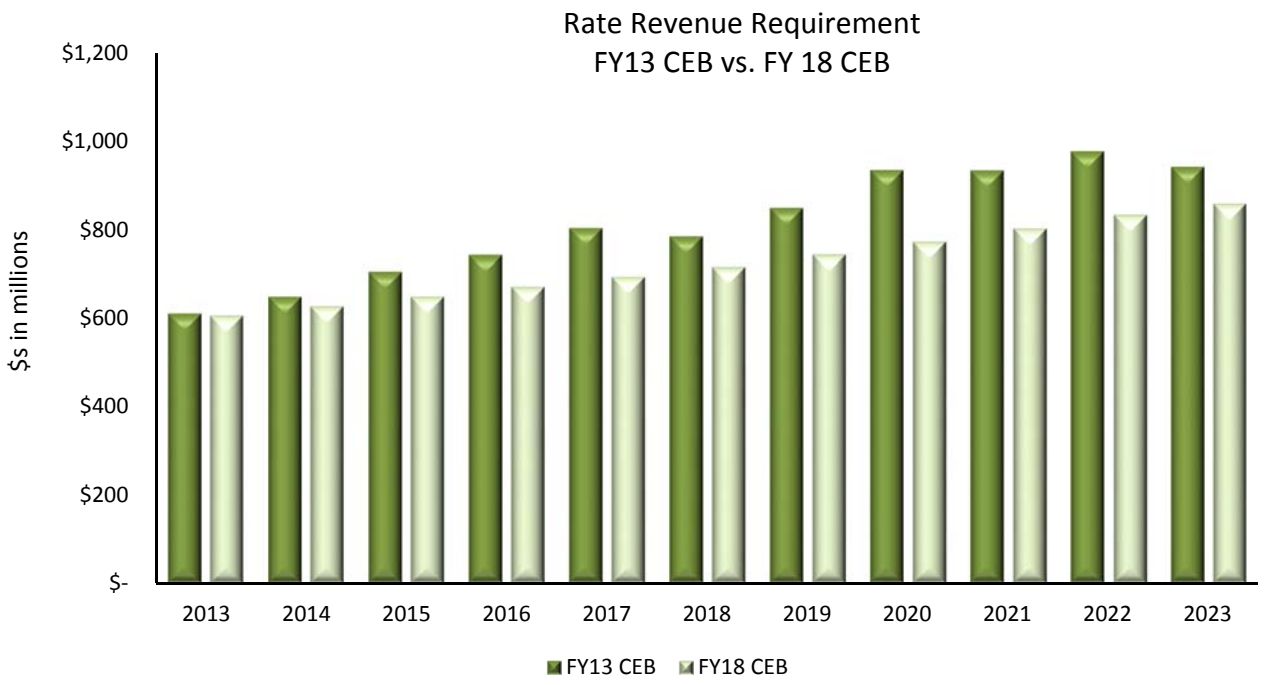
## The Five-Year Spending Cap

The concept of a five-year spending Cap was first introduced at the Advisory Board's recommendation in 2003 for the FY04-08 period. The Cap represents targeted spending levels to ensure adequate capital program funding and to serve as a guide for long-term planning estimates and community assessments. The graph below describes the history of the past three five-year caps and the Proposed FY19-23 Cap, both in terms of the Cap levels and actual spending.



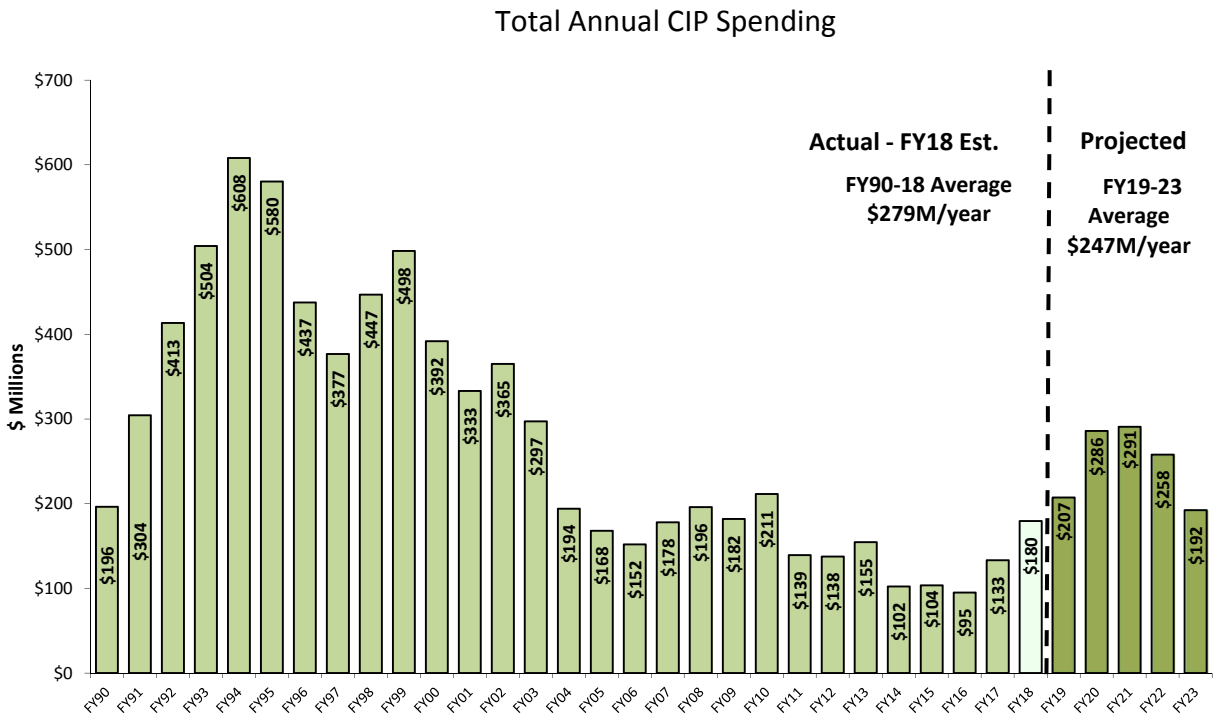

The current Cap (FY14-18) was significantly less than the prior two Caps for a variety of reasons: to meet the Authority's goal of reducing outstanding debt, the largest driver of assessment increases, to recognize the nearing of the CSO program completion, to address the economic challenges facing our communities and ratepayers, and to satisfy the Advisory Board recommendation of less than $800 million spending for the FY14-18 Cap period.

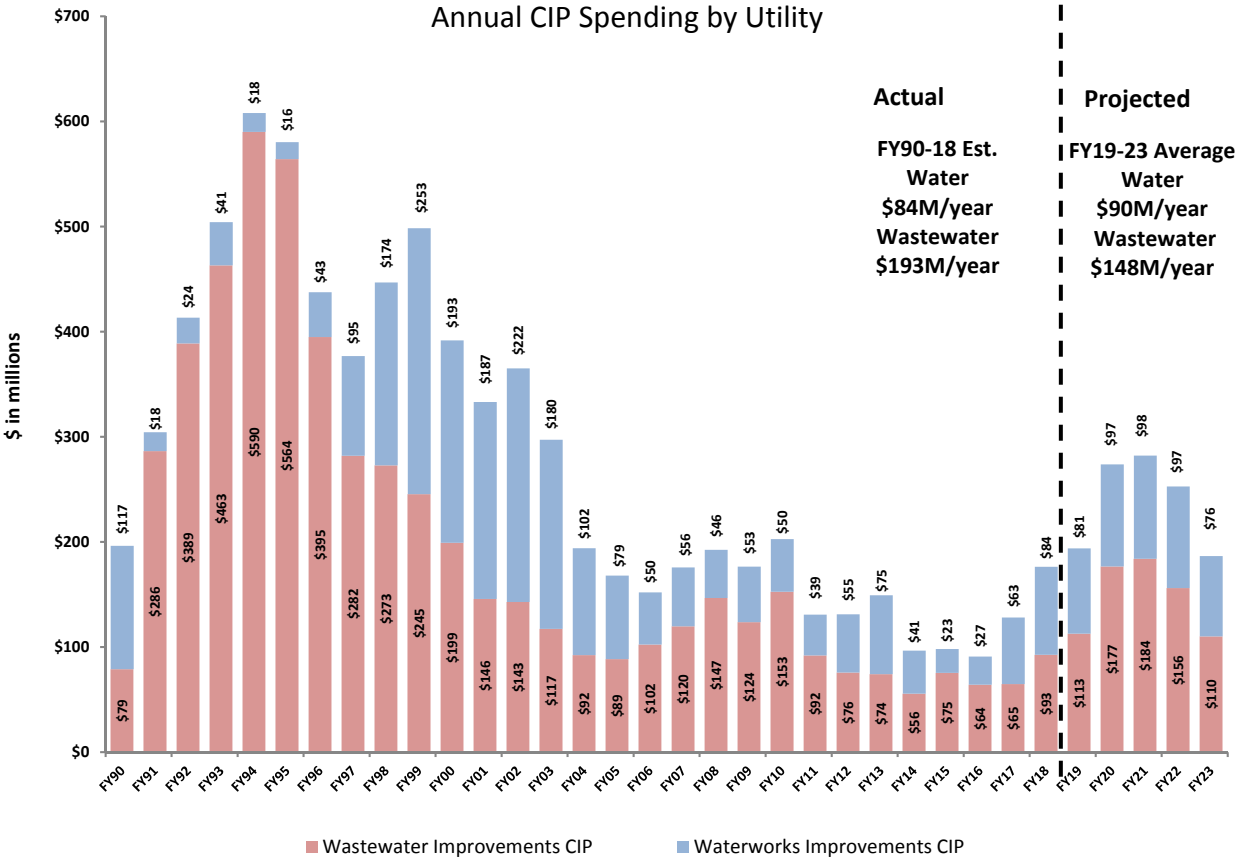
Today, the Authority is positioned much better than a few years ago to reinvest in rehabilitation and replacement of aging facilities as result of conservative fiscal management which includes judicious control of expenses and implementation the practice of debt defeasance. The debt service associated with the reduction in total bonded indebtedness has contributed to the majority of the $804.0 million or 9.1% reduction in the Rate Revenue Requirement based on the FY18 budget versus the projections in FY13. The Rate Revenue Requirement is the amount of funding that is required to be raised for the MWRA operating budget.




It is important to note that the spending on capital programs is largely determined by the nature, magnitude, and number of upcoming projects. In the prior five-year Caps, specifically FY04-08 and FY09-13, the majority of spending was driven by court-mandated projects and building new facilities. During the FY14-18 Cap, the Authority reached substantial completion on its court-mandated CSO Control Plan at an approximate total cost of $910.0 million. The Authority's main focus going forward is asset protection and water system redundancy. The FY19 Proposed CIP includes approximately $1.0 billion in future expenditures for asset protection and continues to fund the critical redundancy for the Metropolitan Tunnels System at approximately $1.4 billion over a seventeen-year period. However, the FY19-23 period includes only $17.0 million related to the tunnels.

The following two charts below capture the historical CIP spending through FY17 and projects spending through FY23 based on the FY19 Proposed CIP both overall at the MWRA level and by utility. Average total annual CIP spending through FY18 was $279 million. Average annual CIP spending for the proposed FY19-23 Cap is projected to be $247 million. Average annual CIP spending through FY18 was $84 million for Waterworks and $193 million for Wastewater. Average annual CIP spending for the proposed FY19-23 Cap is projected to be $90 million for Waterworks and $148 million for Wastewater.


Total Annual CIP Spending
$ Millions
$700
$600
$500
$400
$300
$200
$100
$0
Actual - FY18 Est.
FY90-18 Average
$279M/year
Projected
FY19-23
Average
$247M/year
$196 $304 $413 $504 $608 $580 $437 $377 $447 $498 $392 $333 $365 $297 $194 $168 $152 $178 $196 $182 $211 $139 $138 $155 $102 $104 $95 $133 $180 $207 $286 $291 $258 $192
FY90 FY91 FY92 FY93 FY94 FY95 FY96 FY97 FY98 FY99 FY00 FY01 FY02 FY03 FY04 FY05 FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18 FY19 FY20 FY21 FY22 FY23


Annual CIP Spending by Utility
$ in millions
$700
$600
$500
$400
$300
$200
$100
$0
Actual
FY90-18 Est.
Water
$84M/year
Wastewater
$193M/year
Projected
FY19-23 Average
Water
$90M/year
Wastewater
$148M/year
$117 $18 $24 $41 $18 $16 $43 $95 $174 $253 $193 $187 $222 $180 $102 $79 $50 $56 $46 $53 $50 $39 $55 $75 $41 $23 $27 $63 $84 $81 $97 $98 $97 $76
$79 $286 $389 $463 $590 $564 $395 $282 $273 $245 $199 $146 $143 $117 $92 $89 $102 $120 $147 $124 $153 $92 $76 $74 $56 $75 $64 $65 $93 $113 $177 $184 $156 $110
FY90 FY91 FY92 FY93 FY94 FY95 FY96 FY97 FY98 FY99 FY00 FY01 FY02 FY03 FY04 FY05 FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18 FY19 FY20 FY21 FY22 FY23
Wastewater Improvements CIP
Waterworks Improvements CIP

**Total MWRA Future Spending**

The FY19 Proposed CIP projects total MWRA future spending of $3.8 billion beginning with FY18. This is an increase of $549.1 million over the FY18 Final CIP transmitted to the Board of Directors in June 2017, with most of the additional spending in years beyond FY19.

Incremental Change in FY19 Proposed CIP
*($s in millions)*

| Division | FY18 Final CIP Future Spending | FY19 Proposed CIP Future Spending | $ Change | % Change |
|---|---|---|---|---|
| Wastewater | $ 1,238.6 | $ 1,511.6 | $ 273.0 | 22.0% |
| Water | $ 1,982.6 | $ 2,237.0 | $ 254.4 | 12.8% |
| Business & Operations Support | $ 32.3 | $ 54.0 | $ 21.7 | 67.2% |
| | | | | |
| Total MWRA | $ 3,253.5 | $ 3,802.6 | $ 549.1 | 16.9% |

Of the $549.1 million added to the CIP, a net of $254.9 million is due to revised construction cost estimates following completion of studies or engineering designs for the projects. Increased cost estimates may be due to updated cost estimates, such as $29.9 million for the Deer Island Treatment Plant Clarifier Rehabilitation Project – phase 2 due to revised concrete and coating system costs, and $10.0 million for the Deer Island Treatment Plant Sodium Hypochlorite Tank Replacement. The cost estimates may change due to revised scopes for the projects, such as $28.3 million for Prison Point Rehabilitation Construction, $35.5 million for Cambridge Branch Sewer Sections 23 & 24 and 26 & 27 – Construction, $17.0 million for Deer Island Treatment Plant Electrical Equipment Upgrades 6 – Construction, $14.0 million for Shaft 12 Isolation Gate Construction, and $11.0 million for the Nut Island Headworks Odor Control and HVAC Improvements. Cost estimates may also decrease. The largest decrease was $13.0 million for Winthrop Sewer Sections 4, 5, 6 & 186 – Construction, which requires less than anticipated work.

There were $234.7 million in new projects added in the FY19 Proposed CIP, which are described in the next section. The remaining balance is due to inflation on unawarded contracts and schedule changes.

**FY19 New Projects**

The FY19 Proposed CIP adds $234.7 million in new projects of which Wastewater projects added total $105 million while Waterworks projects total $125.2 million.

FY19 New Projects by Division
*($s in millions)*

| Division | Total Contract Amount | FY19-23 Spending |
|---|---|---|
| Wastewater | $105.0 | $77.0 |
| Waterworks | $125.2 | $27.7 |
| Business and Ops Support | $4.5 | $4.5 |
| **Total New Projects** | **$234.7** | **$109.2** |

The following table shows the new projects added by the major programs:

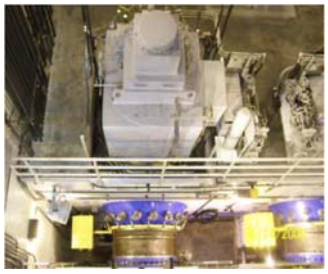
*($s in millions)*

| Project | Total Contract Amount | FY19-23 Spending |
|---|---|---|
| Deer Island Asset Protection | $15.0 | $13.3 |
| I/I Local Financial Assistance Program | $90.0 | $63.7 |
| Carroll Water Treatment Plant Asset Protection | $38.3 | $2.3 |
| Dam Projects | $1.8 | $1.8 |
| Sudbury/Weston Aqueduct Repairs | $3.9 | $0.0 |
| Watershed Land | $5.0 | $5.0 |
| Cathodic Protection | $62.2 | $18.1 |
| NHS Revere & Malden Pipeline Improvements | $12.9 | $0.0 |
| Waterworks Facility Asset Protection | $0.6 | $0.0 |
| Distribution System Facilities Mapping | $0.5 | $0.5 |
| Capital Maintenance Planning & Support | $4.5 | $4.5 |
| **Total New Projects** | **$234.7** | **$109.2** |

New projects with anticipated contract amounts of $10 million or more for Wastewater are:

**Infiltration/Inflow Local Financial Assistance** - Phases 11 & 12 - $120 million ($60 million each new phase - $90 million of expenditures net of repayments) for rehabilitation of local sewer collection systems.

**Deer Island Wastewater Treatment Plant -** Hydroturbine Replacements - $12.0 million to replace the two 1.1 megawatt hydroturbine generators (HTGs) at Deer Island. Electricity is generated using the gravitational force of plant effluent as it drops down the outfall shaft from the disinfection basins. Effluent flows into the intake channel beneath each HTG by opening computer-operated wicket gates. The hydroturbines came on line in July 2001. Because of the harsh environment at Deer Island, the equipment has reached the end of its useful life. The average savings generated by the hydroturbines is approximately $458,000 per year.



New projects with anticipated contract amounts of $10 million or more for Waterworks are:

**Cathodic Protection (Metropolitan System)** - $57.0 million to replace the existing cathodic protection systems in order to maintain pipe and steel storage tank integrity.

**Carroll Water Treatment Plant Ozone Generator Replacement** - $20.0 million to replace the ozone generators, which are currently scheduled to be rebuilt in 2022 and replaced by 2030.

**Sections 13 & 48 Rehabilitation -** $12.9 million rehabilitation of 7,300 linear feet of Section 13 (36-inch cast-iron) and 7,300 linear feet of Section 48 (38-inch diameter riveted steel) in Stoneham, Malden and Melrose from the Gate House at Fells Reservoir to Pleasant Street in Malden. This project will improve hydraulics and water quality. Malden meters 16 and 187 and Medford meters 65 and 159 are connected to the distribution system via Sections 13 and 48. These four meters supply areas of the two communities at a generally higher elevation than the remaining community meters. Sections 13 and 48 are unlined cast-iron and steel water mains, respectively. Portions of these mains were disconnected from the Fells Reservoir in 1988 due to hydraulic and water quality problems, and to meet the Safe Drinking Water Act requirements.

**Carroll Water Treatment Plant Ultraviolet (UV) Reactor Replacement** - $10.0 million for replacement of the UV reactors which will likely be required by 2034.

A complete list of new projects with cash flows and descriptions can be found in Appendix 3.

**FY19-23 Five-Year Spending Cap**

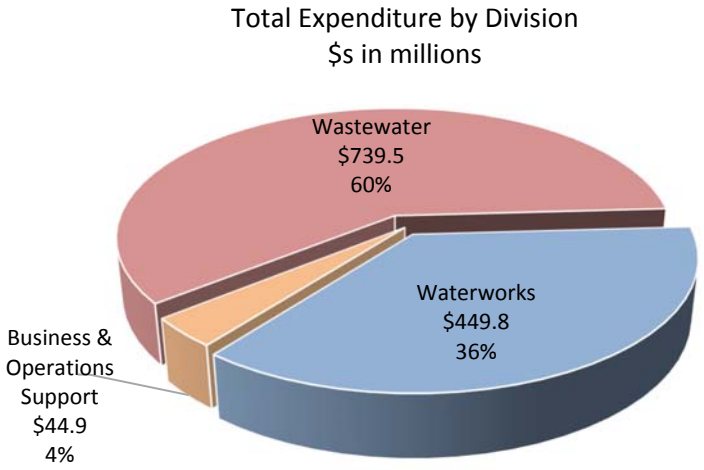
Spending during the FY19-23 timeframe is planned to be $1.2 billion, including local community spending of $111.8 million for the I/I loan and grant program and $52.3 for the water pipeline loan program.

Annual cash flows for the proposed Cap period are shown below in millions:

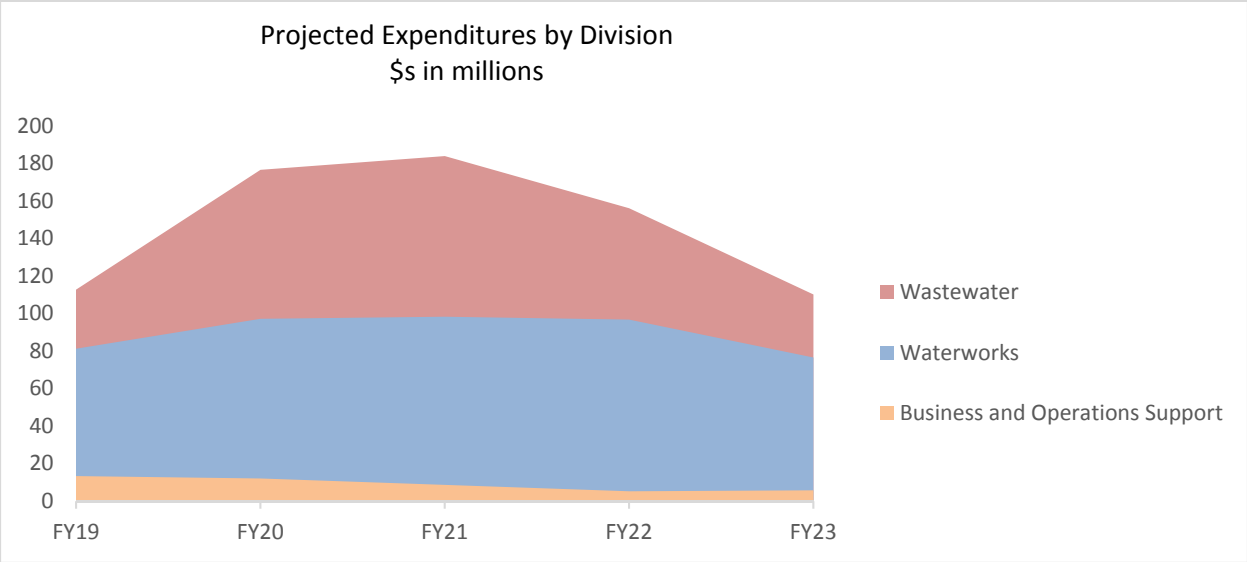
| | | FY19 | FY20 | FY21 | FY22 | FY23 | Total FY19-23 |
|---|---|---|---|---|---|---|---|
| FY19 Proposed | Projected Expenditures | $207.2 | $285.8 | $290.8 | $258.0 | $192.3 | $1,234.1 |
| | I/I Program | (14.0) | (23.2) | (27.2) | (22.4) | (25.0) | (111.8) |
| | Water Loan Program | (13.3) | (14.0) | (10.7) | (8.7) | (5.5) | (52.3) |
| | **MWRA Spending** | **179.9** | **248.6** | **252.9** | **226.9** | **161.8** | **$1,070.1** |
| | Contingency | 12.5 | 17.2 | 17.5 | 15.9 | 11.3 | 74.2 |
| | Inflation on Unawarded Construction | 0.0 | 8.2 | 15.1 | 18.9 | 15.7 | 58.0 |
| | Chicopee Valley Aqueduct Projects | 0.0 | 0.0 | 0.0 | (0.3) | (1.0) | (1.3) |
| | **FY19 Proposed FY19-23 Spending** | **$192.4** | **$274.0** | **$285.4** | **$261.4** | **$187.7** | **$1,201.0** |

The format of the Cap table has changed to account separately for MWRA spending, which excludes the local I/I grant and loan program and the local water pipeline loan spending which are both outside of MWRA's control. As in past Caps, contingency for each fiscal year is incorporated into the CIP to fund the uncertainties inherent to construction. The contingency budget is calculated as a percentage of budgeted expenditure outlays. Specifically, contingency is 7% for non-tunnel projects and 15% for tunnel projects. Inflation is added for unawarded construction contracts. Finally, the Cap excludes Chicopee Valley Aqueduct system projects.

Total Projected Expenditures for the Proposed FY19-23 Cap period by division is illustrated in the pie chart below:



The cumulative spending by year and by division is shown in the graph below highlighting the increased investment in wastewater during the FY19-23 Cap period.



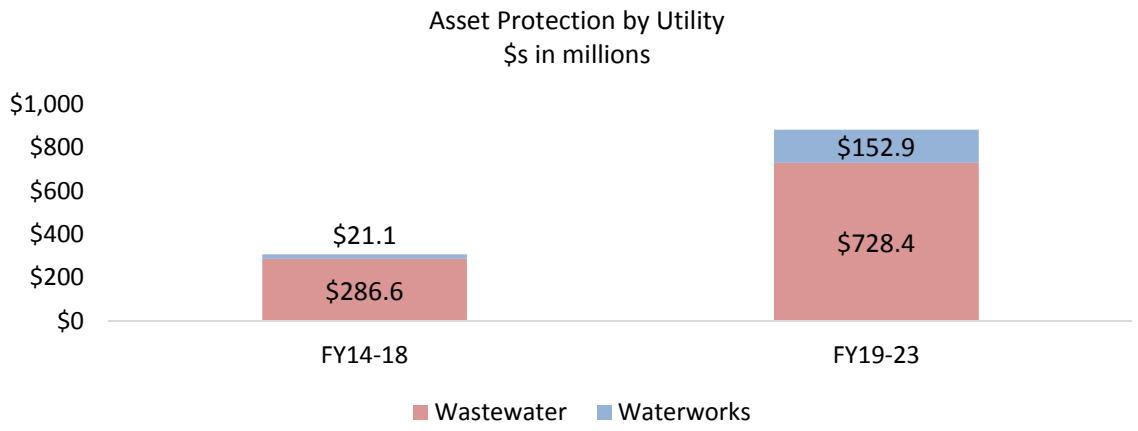

Breaking down the expenditures within each division, yearly Projected Expenditures for the Proposed FY19-23 Cap period by program are shown below in millions:

| | FY19 | FY20 | FY21 | FY22 | FY23 | Total FY19-23 |
|---|---|---|---|---|---|---|
| **Wastewater System Improvements** | **$112.7** | **$176.6** | **$183.9** | **$156.1** | **$110.1** | **$739.5** |
| Interception & Pumping | 47.1 | 64.5 | 61.6 | 41.1 | 26.6 | 240.9 |
| Treatment | 46.7 | 82.9 | 91.8 | 91.7 | 57.4 | 370.4 |
| Residuals | 4.0 | 3.1 | 0.8 | 1.0 | 1.1 | 10.0 |
| CSO | 0.9 | 2.8 | 2.6 | - | - | 6.3 |
| Other Wastewater | 14.0 | 23.2 | 27.2 | 22.4 | 25.0 | 111.8 |
| | | | | | | |
| **Waterworks System Improvements** | **$81.2** | **$97.2** | **$98.3** | **$96.7** | **$76.5** | **$449.8** |
| Drinking Water Quality Improvements | 1.7 | 1.6 | 2.8 | 2.2 | 0.5 | 8.9 |
| Transmission | 8.3 | 7.3 | 7.9 | 6.6 | 9.2 | 39.3 |
| Distribution & Pumping | 49.4 | 68.4 | 66.8 | 67.3 | 57.5 | 309.4 |
| Other Waterworks | 21.8 | 19.8 | 20.7 | 20.6 | 9.3 | 92.3 |
| | | | | | | |
| **Business & Operations Suppport** | **13.3** | **12.0** | **8.6** | **5.2** | **5.7** | **44.9** |
| | | | | | | |
| **Total MWRA** | **$207.2** | **$285.8** | **$290.8** | **$258.0** | **$192.3** | **$1,234.1** |

It is important to emphasize that the majority of spending within the Wastewater and Waterworks programs is concentrated in several larger projects with significant spending in the FY19-23 timeframe. Project contracts with expenditures greater than $15 million for the FY19-23 Cap total $733.7 million, including local community assistance programs, account for nearly 60% of spending.

| Project | Contract | Projected FY19-23 Expenditures $s in millions |
|---|---|---|
| 206 DI Treatment Plant Asset Protection | Clarifier Rehab Phase 2 - Construction | $129.9 |
| 765 Local Water Pipeline Improvement Loan Program | LWSAP Phase 3 Distributions | 90.0 |
| 765 Local Water Pipeline Improvement Loan Program | LWSAP Phase 2 Distributions | 63.5 |
| 145 Facility Asset Protection | Chelsea Creek Headworks Upgrades - Construction | 42.7 |
| 206 DI Treatment Plant Asset Protection | HVAC Equipment Replacement - Construction | 38.8 |
| 132 Corrosion & Odor Control | NI Odor Control HVAC Improvement - Construction Phase 2 | 38.5 |
| 145 Facility Asset Protection | Prison Point Rehab - Construction | 34.1 |
| 128 I/I Local Financial Assistance | Phase 10 Grants | 32.9 |
| 128 I/I Local Financial Assistance | Phase 11 Grants | 28.5 |
| 723 Northern Low Service Rehabilitation Section 8 | Sec 50 & 57 Water & 21/20/19 Sewer Rehab - Construction | 25.5 |
| 765 Local Water Pipeline Improvement Loan Program | Lead Service Line Replacement Loans | 25.0 |
| 128 I/I Local Financial Assistance | Phase 9 Grants | 22.0 |
| 128 I/I Local Financial Assistance | Phase 12 Grants | 21.0 |
| 206 DI Treatment Plant Asset Protection | Fire Alarm System Replacement - Construction | 20.0 |
| 628 Metro Redundancy Interim Improvement | WASM 3 - Construction 1 | 19.8 |
| 206 DI Treatment Plant Asset Protection | SSPS VFD Replace Construction | 19.6 |
| 206 DI Treatment Plant Asset Protection | Gravity Thickener Rehab | 18.0 |
| 727 Southern Extra High Redundancy & Storage | Redundancy Pipeline Sect 111 - Construction 3 | 17.3 |
| 722 NIH Redundancy & Storage | Section 89 & 29 Replacement - Construction | 16.0 |
| 722 NIH Redundancy & Storage | Section 89 & 29 Redundancy - Construction Phase 2 | 15.3 |
| 628 Metro Redundancy Interim Improvement | WASM/Spot Pond Supply Mains West PRV - Construction | 15.2 |
| | **Total Contracts > $15 million** | **$733.7** |
| | **% of FY19-23 Spending** | **59.4%** |
| | **Excluding Community Loan Programs** | **$450.8** |
| | **% of FY19-23 Spending** | **36.5%** |
| | **Total FY19-23 Spending** | **$1,234.1** |

Asset Protection accounts for the largest share of capital expenditures for the FY19-23 period, tripling the expenditure level of the FY14-18 spending cap.




**Future Spending**

The FY19 Proposed CIP includes $891.8 million for Asset Protection initiatives, representing 72.3% of total MWRA spending in this timeframe. Wastewater and Waterworks Asset Protection are $728 million and $153 million, respectively. The Deer Island Treatment Plant Asset Protection accounts for over $366 million in spending. Spending for water system redundancy projects totals $229.5 million in the same FY19-23 period, accounting for 18.6% of total spending. Looking ahead to the FY24-28 Cap period, Asset Protection and the Water System Redundancy accounting for almost 100% of the total expenditures.

Changing nature of the CIP by Category
($s in millions)

| Project Category | FY14-18 | FY19-23 | FY24-28 |
|---|---|---|---|
| Asset Protection | $312.0 | $891.8 | $789.0 |
| Carroll WTP | 11.8 | 3.3 | 9.3 |
| Water Redundancy | 174.6 | 229.5 | 505.5 |
| CSO | 66.1 | 6.3 | 0.0 |
| Other | 49.1 | 103.2 | -145.6 |
| **Total** | **$613.6** | **$1,234.1** | **$1,158.2** |
| | | | |
| **Asset Protection** | **50.8%** | **72.3%** | **68.1%** |
| Carroll WTP | 1.9% | 0.3% | 0.8% |
| **Water Redundancy** | **28.5%** | **18.6%** | **43.6%** |
| CSO | 10.8% | 0.5% | 0.0% |
| Other | 8.0% | 8.4% | -12.6% |
| **Total** | **100.0%** | **100.0%** | **100.0%** |

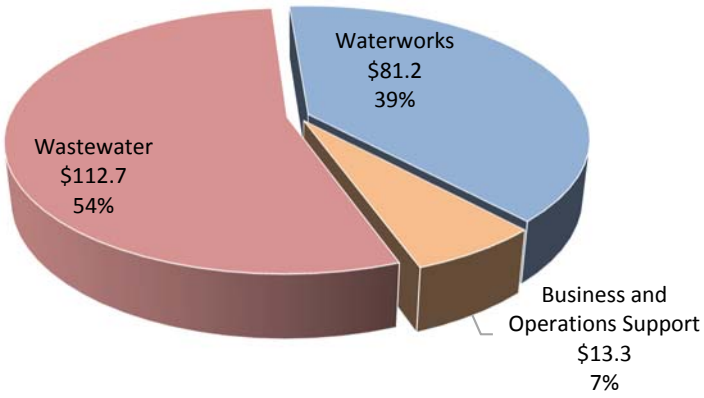
| Project Category | Total FY19-23 | Total FY24-28 |
|---|---|---|
| **Wastewater System Improvements** | **$739.5** | **$597.8** |
| Interception & Pumping | 240.9 | 200.6 |
| Treatment | 370.4 | 318.8 |
| Residuals | 10.0 | 47.3 |
| CSO | 6.3 | - |
| Other Wastewater | 111.8 | 31.1 |
| | | |
| **Waterworks System Improvements** | **$449.8** | **$554.4** |
| Drinking Water Quality Improvements | 8.9 | 14.5 |
| Transmission (excluding Metro Tunnels) | 22.3 | 54.1 |
| Metro Tunnels Redundancy | 17.0 | 348.0 |
| Distribution & Pumping | 309.4 | 338.2 |
| Other Waterworks | 92.3 | (200.4) |
| | | |
| **Business & Operations Suppport** | **44.9** | **-** |
| | | |
| **Total MWRA** | **$1,234.1** | **$1,152.2** |

The table to the left depicts CIP projected spending for the FY19-23 Cap period and FY24-28 Cap period by major program categories for Wastewater Systems Improvements, Waterworks System Improvements and Business and Operations Support. The Metropolitan Tunnels Redundancy projects accounts for the increase in Transmission spending for Waterworks in the FY24-28 Cap period. The $200 million credit in the same period for Other Waterworks represents the repayment of community water loans. Any new phase of the loan program would offset the credit.

**FY19 Spending**

The FY19 Proposed CIP forecasts $207.2 million spending for FY19, of which $112.7 million supports Wastewater System Improvements, $81.2 million supports Waterworks System Improvements, and $13.3 million is for Business and Operations Support. Included in the $207.2 million are net expenditures of $27.3 million for community assistance programs, $14 million for local I/I program and $13.3 million for local water pipeline program.

FY19 Expenditures by Division
$s in millions

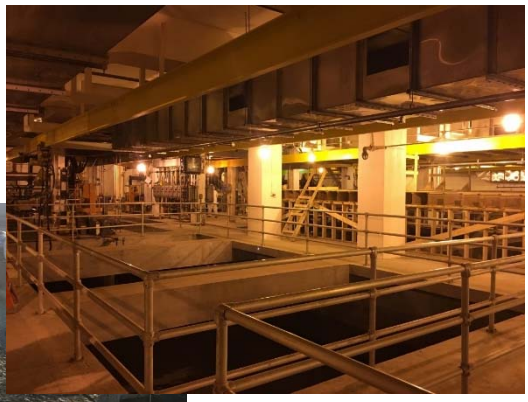


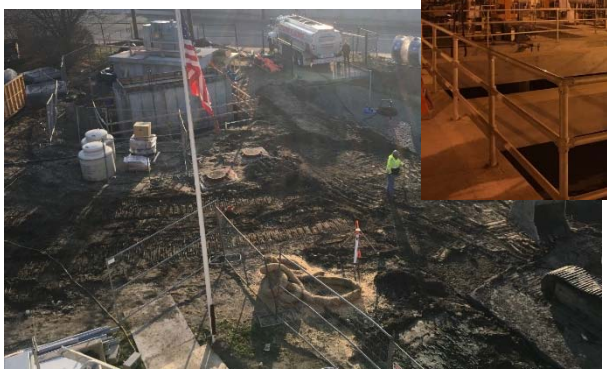
The table below lists the twelve projects the highest anticipated expenditures in FY19:

| Project | Contract | Projected FY19 Expenditures $s in millions |
|---|---|---|
| 145 Facility Asset Protection | Chelsea Creek Headworks Upgrades - Construction | $25.8 |
| 765 Local Water Pipeline Improvement Loan Program | LWSAP Phase 2 Distributions | 20.3 |
| 206 DI Treatment Plant Asset Protection | Clarifier Rehab Phase 2 - Construction | 16.2 |
| 722 NIH Redundancy & Storage | Section 89 & 29 Redundancy Construction Phase 2 | 11.0 |
| 765 Local Water Pipeline Improvement Loan Program | LWSAP Phase 3 Distributions | 10.0 |
| 727 Southern Extra High Redundancy & Storage | Redundancy Pipeline Sect 111 - Construction 2 | 8.4 |
| 206 DI Treatment Plant Asset Protection | HVAC Equipment Replacement - Construction | 7.8 |
| 128 I/I Local Financial Assistance | Phase 9 Grants | 7.5 |
| 727 Southern Extra High Redundancy & Storage | Redundancy Pipeline Sect 111 - Construction 3 | 7.1 |
| 132 Corrosion & Odor Control | NI Odor Control HVAC Improvement - Construction 2 | 6.5 |
| 766 Waterworks Facility Asset Protection | Steel Tank Painting Deer Island, Bellevue 2 & Turkey Hill | 5.5 |
| 765 Local Water Pipeline Improvement Loan Program | Lead Service Line Replacement Loans | 5.0 |
| | **Total Contracts > $5.0 million** | **$131.1** |
| | **% of FY19 Spending** | **63.3%** |
| | **Excluding Community Loan Programs** | **$88.3** |
| | **% of FY19 Spending** | **42.6%** |
| | **Total projected FY19 Spending** | **$207.2** |

Projects with spending greater than $5 million in FY19, excluding local community assistance programs, account for nearly 43% of the total spending and include:

**Chelsea Creek Headworks Upgrade Construction** - $25.8 million ($77.5 million total construction cost). This major rehabilitation project includes replacement/upgrade to the screens, grit collection system, grit and handling systems, odor control systems, HVAC, mechanical, plumbing and instrumentation. Solids handling systems are being automated and the building's egress and fire suppressions systems are also being upgraded.

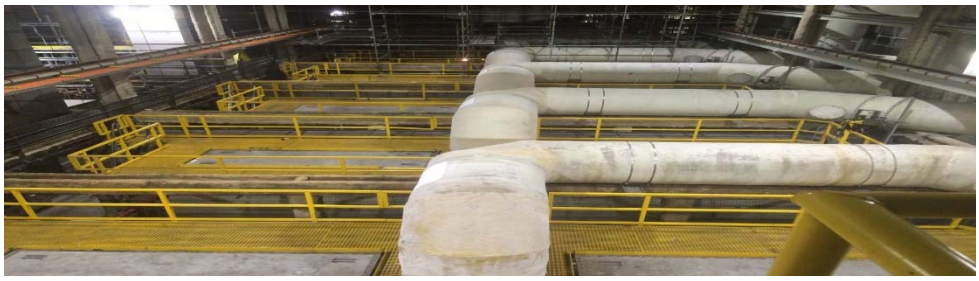




**Northern Intermediate High (NIH) Section 89 & 29 Redundancy Construction Phase 2** - $11.0 million ($22.7 million total construction cost). This is a redundancy project for MWRA's Northern Intermediate High service area. Currently, this area is primarily supplied by a single 48-inch diameter pipeline, the Gillis Pump Station, and water distribution storage from the Bear Hill Tank. This project includes a new seven-mile redundant pipeline under four construction phases. This project will provide uninterrupted water supply to the service area in the event of a failure of the existing single supply pipe and will allow the existing pipe to be removed from service for inspection, maintenance, and repair. Phase 1A was completed; Phase 1B began in January 2016. Phase 1C was awarded in November 2016 and Phase 2 was awarded in June 2017.

**Southern Extra High (SEH) Redundancy Section 111 Phase 2 & 3 Construction** - $13.1 million ($35.5 million total construction cost). This is a redundancy project for MWRA's Southern Extra High service area. This project will provide redundancy to Sections 77 and 88 serving Boston, Norwood, Stoughton, and Dedham-Westwood, through construction of a redundant pipeline. Phase 1 will be substantially complete in September 2018. Phase 2 began in October 2017 and Phase 3 is anticipated to be awarded in April 2018.

**Nut Island Odor Control & HVAC Improvements - Construction Phase 2** - $6.5 million ($38.5 million total construction cost). Improvements to the Nut Island Headworks odor control, HVAC and energy management systems. These are the long-term



improvements project following the January 2016 fire and the odor control, HVAC and energy management systems evaluation contract completed in February 2017.

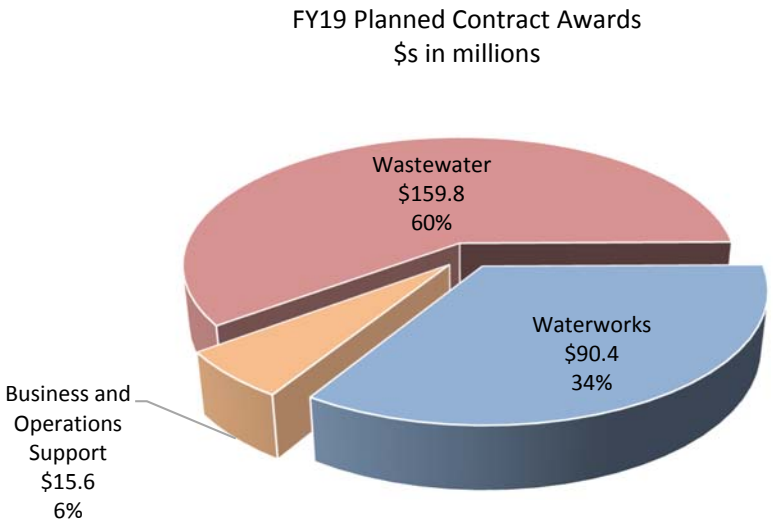
**Steel Tanks Repainting: Deer Island, Bellevue 2, Turkey Hill** - $5.5 million ($7.0 million total project cost). This contract includes the repainting of three (Deer Island, Bellevue 2 and Turkey Hill) out of six steel water distribution storage tanks. The remaining three steel tanks (Bellevue 1, Arlington Heights and Walnut Hill) require structural and SCADA improvements and repainting will be included with these improvements under a future contract.

**Deer Island Wastewater Treatment Plant Asset Protection:**

**Clarifier Rehabilitation Phase 2 Construction** - $16.2 million ($129.9 million total construction cost). This project will rehabilitate the sludge removal system in the primary tanks and the aeration/recirculation systems in the secondary tanks. The influent gates, effluent launders and aeration systems, and concrete corrosion in primary clarifiers will also be addressed and repaired. This contract is anticipated to be awarded in June 2018.

**HVAC Equipment Replacement Construction -** $7.8 million ($38.8 million total construction cost). This project will replace two obsolete HVAC control systems and one manufacturer's system, reducing replacement parts and improving automation. This contract is anticipated to be awarded in March 2018.

## FY19 Anticipated Contract Awards




Future CIP spending is based on current and future contract awards. 46 contracts totaling $265.7 million are projected to be awarded in FY19. The largest ten projected contract awards total $178.0 million and are listed below, accounting for 67% of expected awards:

| Project | Subphase | Contract Budget | FY19-23 Spending |
|---|---|---|---|
| | | ($s in millions) | |
| 132 Corrosion & Odor Control | NI Odor Control HVAC Improvement - Construction 2 | $38.5 | $38.5 |
| 145 Facility Asset Protection | Prison Point Rehabilitation - Construction | $34.1 | $34.1 |
| 723 Northern Low Service Rehab Sec8 | Sec 50 & 57 Water & 21/20/19 Sewer Rehab Construction | $25.5 | $25.5 |
| 206 DI Treatment Plant Asset Protection | Fire Alarm System Replacement - Construction | $20.0 | $20.0 |
| 145 Facility Asset Protection | Ward Street & Columbus Park Headworks Des/CA/REI | $12.0 | $6.4 |
| 625 Metro Tunnel Redundancy | Conceptual Design - Environmental Impact Review | $10.6 | $10.6 |
| 206 DI Treatment Plant Asset Protection | MCC & Switchgear Replacement Construction | $10.6 | $10.6 |
| 618 Peabody Pipeline Project | Peabody Pipeline Construction | $9.4 | $9.4 |
| 702 New Connect Mains-Shaft 7 | CP3-Sect 23,24,47 Rehabilitation | $9.4 | $9.4 |
| 206 DI Treatment Plant Asset Protection | Switchgear Relay Replacement Construction | $8.0 | $8.0 |
| | **Top 10 Contract Awards FY19** | **$178.0** | **$172.4** |
| | **% of Total Awards** | **67%** | **68%** |
| | **Total 46 Contracts for FY19** | **$265.7** | **$253.5** |

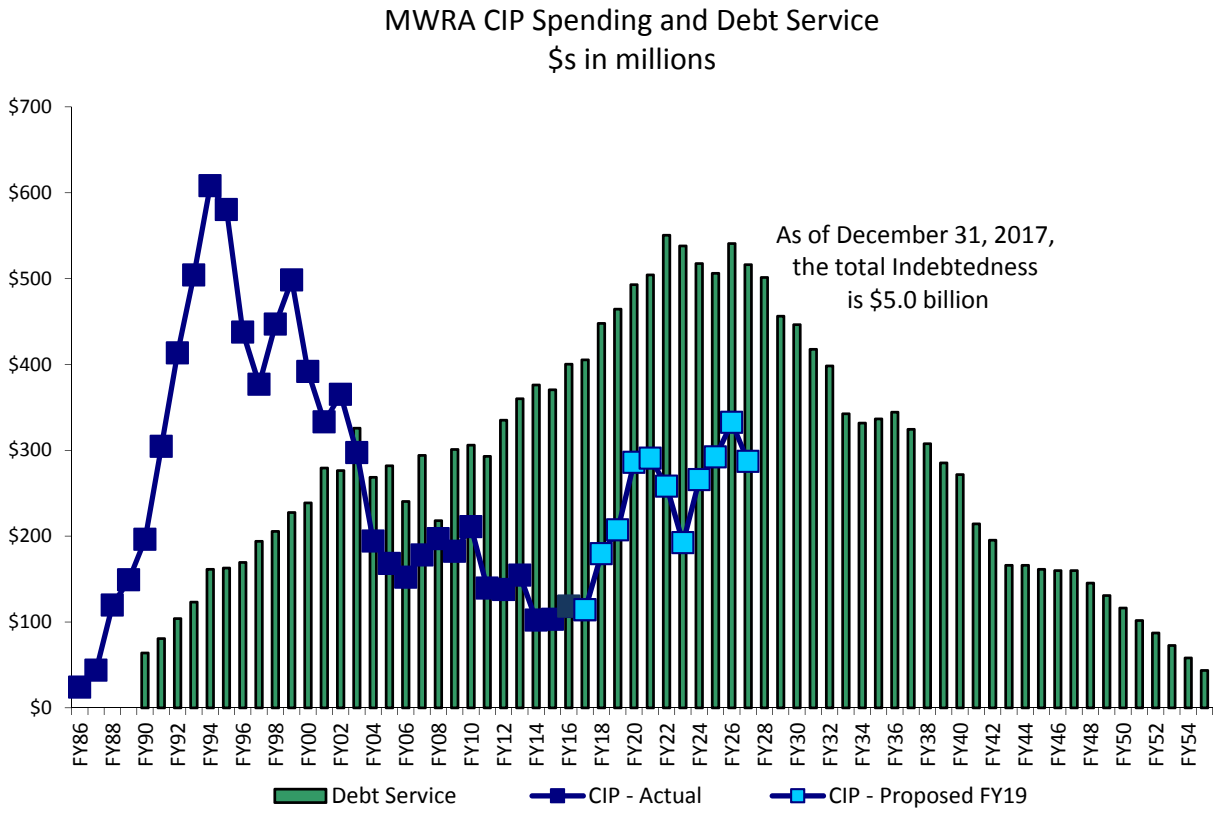
**Community Water and Sewer Assistance Programs**

The Infiltration/Inflow (I/I) Local Financial Assistance Program provides funding assistance in the form of grants and loans for communities to rehabilitate their sewerage collection systems with the goal of structurally reducing I/I flow. The loan distribution portion of the program is repaid back to the MWRA interest free. Presently, $13.9 million is forecasted to be spent in FY19 and $111.8 million is forecasted during the FY19-23 Spending Cap period which is net of all repayments during these time frames. During the FY15 CIP development, Phases 9 and 10 were added to the CIP at $80 million each to be distributed as 75% grants and 25% interest-free loans. By comparison Phases 1 and 2 were 25% grants and 75% interest-free loans. The grant/loan ratio was revised for phases 3 through 8 to 45% grants and 55% interest-free loans. Payback periods for Phases 9 and 10 were also extended from 5 years to 10 years. Distribution of funds is authorized through FY2025. During the FY19 Proposed CIP development, Phases 11 and 12 were added at $60 million each to be distributed as 75% grants and 25% interest-free loans. All program funds are allocated to the 43 member communities based on their share of MWRA's wholesale sewer assessment. Binding commitments for funds are issued by MWRA in the form of Financial Assistance Agreements.

The Local Water System Assistance Program provides financial assistance in the form of 10-year, interest-free loans for communities to rehabilitate, either by relining or replacement, each community's proportional share of total unlined pipe miles. Presently, $13.3 million is forecasted to be spent in FY19 and $52.3 million is forecasted during the FY19-23 Spending Cap period which is net of all repayments during these time frames. During the FY17 CIP development, the program was expanded to include $100 million in interest-free loans to communities solely for efforts to fully replace lead service lines. The Lead Service Line Replacement Loan Program is budgeted over twenty years, but the pace of spending for the program will depend on the level of participation by the communities, the communities' ability to work with individual homeowners and future regulatory requirements. Distributions from this program are scheduled to be made from FY18 through FY30 with repayments scheduled for FY19 through FY40.

**MWRA Capital Improvement Spending and Debt Service**

As of December 31, 2017, MWRA's total debt is $5.0 billion, which $0.2 million less than the MWRA's total debt as of June 30, 2017. However, debt service obligations are projected to increase in coming years peaking in 2022.




**Project Level Budget Summaries and Detail of Changes**

Information on individual project budgets and detail of changes is provided in the supplemental appendices attached to this document.

**CIP Review and Adoption Process**

The Advisory Board will have 60 days from the transmittal of the FY19 Proposed CIP and proposed FY19-23 spending Cap to review the budget and prepare comments and recommendations. During the review period, Advisory Board and MWRA staff will continue to meet and discuss the changes to the capital budget. The Advisory Board will then transmit its comments and recommendations to MWRA in the spring after their review. Staff will prepare draft responses to the Advisory Board's recommendations for discussion at the budget hearing. During the spring, MWRA will update the CIP to incorporate the latest information into the Final budget. In June, staff will present the FY19 Final CIP and final FY19-23 Cap to the Board for adoption.