2019 **Annual** Green Bonds Report

Massachusetts Clean Water Trust

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MASSACHUSETTS
CLEAN WATER TRUST

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A Note from the Treasurer

The Green Bond market has expanded rapidly since the Commonwealth of Massachusetts issued its first Green Bonds. In 2013, according to Bloomberg New Energy Finance, Green Bonds accounted for $14.7 billion of bonds issued worldwide. In 2018, Green Bonds exploded to $176.6 billion. Current market trends and projections show that growth will continue into 2019 and beyond. As this innovative marketplace continues to mature, issuers must commit to transparency and accurate reporting for the Green Bond label to continue to instill investor confidence.

As Chair of the Massachusetts Clean Water Trust (the Trust) Board of Trustees, I am pleased to continue the Commonwealth's and the Trust's policy of openness and transparency by submitting our second annual Green Bond Report. To date, the Trust has issued over $800 million in Green Bonds to support 195 local water infrastructure projects.

The Trust provides low interest loans to local governments and other eligible entities for water infrastructure projects across the Commonwealth. Since its establishment, the Trust has financed approximately **$7.3 billion** for nearly **three hundred borrowers**, serving **97%** of the Commonwealth's population.

With its AAA credit rating by all three major credit agencies, the Trust finances vital infrastructure projects that enhance ground and surface water resources, ensures the safety of drinking water, protects public health and develops resilient communities. Access to below-market rate financing makes improvements to water infrastructure more feasible while reducing the overall financial impact on communities and ratepayers.

We are pleased to contribute to this innovative marketplace and stay committed to improving our communication and transparency. We ask that you let us know if there are any additional ways that we can meet your needs for information. Your feedback is much appreciated and always welcome.

I am deeply thankful to the dedicated staff of the Trust and our program partners for their tireless work and commitment to the communities of the Commonwealth. While the impact of these investments may not always be visible to the public, it is felt in every glass of water poured, in restored water bodies, and in homes and businesses that receive safe and reliable water.

Sincerely,

Deborah D. Goldberg
Treasurer and Receiver-General
Commonwealth of Massachusetts

Introduction to the Trust

The Massachusetts Clean Water Trust (the Trust), in collaboration with the Massachusetts Department of Environmental Protection (MassDEP), helps communities build or replace water infrastructure that enhances ground and surface water resources, ensures the safety of drinking water, protects public health and develops resilient communities. It accomplishes these objectives by providing low-interest loans and grants to cities, towns and water utilities through the Massachusetts State Revolving Funds (SRFs). The SRF programs are partnerships between the United States Environmental Protection Agency (USEPA) and the Commonwealth. SRFs function like an environmental infrastructure bank by financing water infrastructure projects.

The Trust administers two SRF programs, the Clean Water and Drinking Water SRFs. The Clean Water SRF (CWSRF) was established in 1987 with amendments to the Clean Water Act. The Drinking Water SRF (DWSRF) was established in 1996 under the amended Safe Drinking Water Act. MassDEP manages project development and oversight while the Trust manages the flow of funds to borrowers.

SRFs receive funding from the USEPA in the form of annual capitalization grants, supplemented by state matching grants and the repayment of loans. When loans to local governments are paid back, the funds are then loaned out again, which is how the fund "revolves."

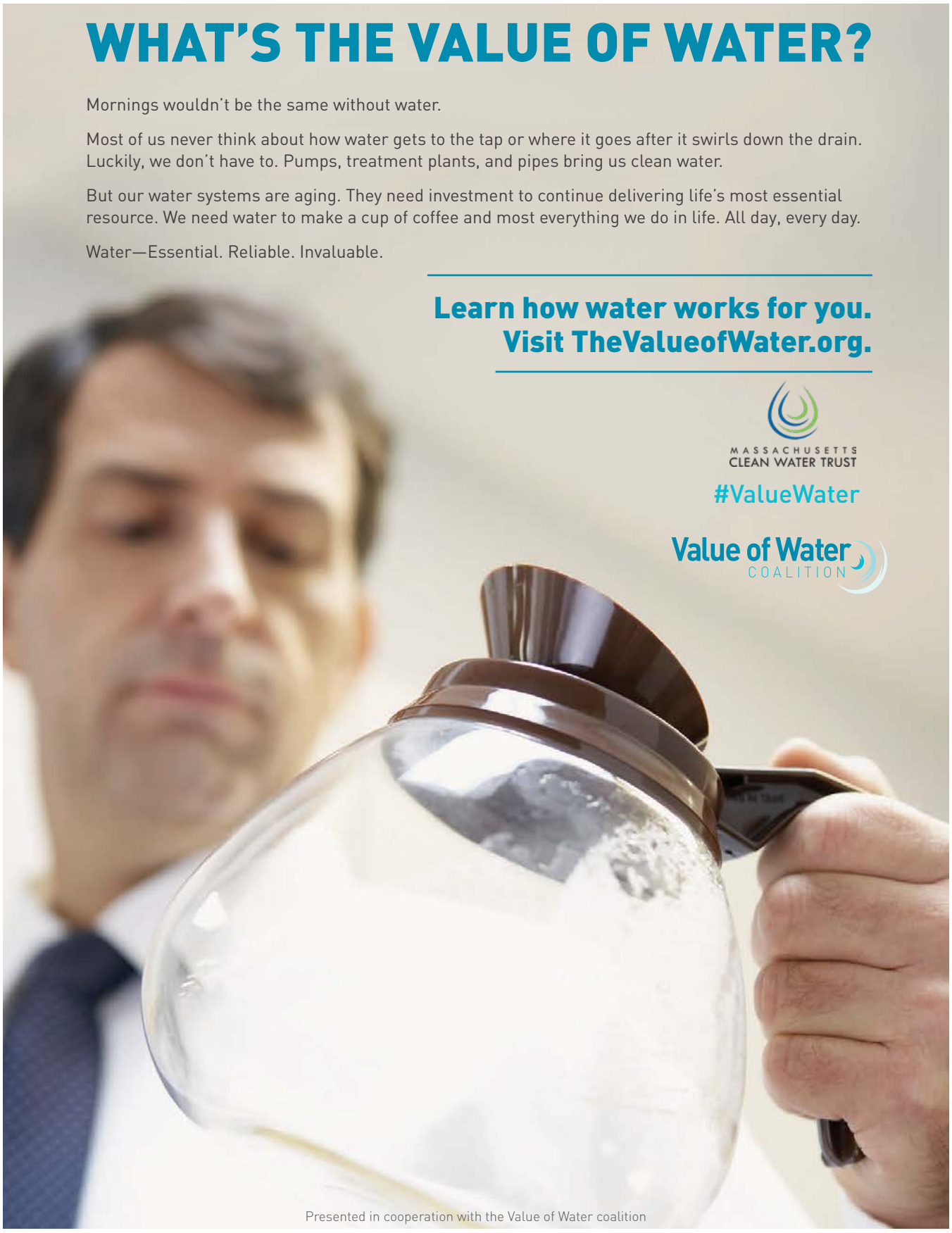
The Trust uses a "leveraged model" to provide funding in excess of the federal and state grants. Bonds are issued in the capital markets and are secured by borrower repayments and reserve funds. The proceeds from bonds are used to provide capital for new, below market rate loans to borrowers for water infrastructure. This model has allowed the Trust to finance approximately $7.3 billion for nearly three hundred borrowers, serving 97% of the Commonwealth's population.

The Trust is administered by a three-member board of trustees that is chaired by the Treasurer of the Commonwealth. The Secretary of the Executive Office for Administration and Finance and the Commissioner of MassDEP serve as trustees. The Board of Trustees approves all financial commitments and program decisions during monthly meetings. Meeting agendas, minutes, and other board materials can be found on the Trust's website.

About this Report

This report is separated into three sections. The first section, the Trust's Green Bond Process, covers program specific project categories, how projects are selected and an overview of how the Trust operates. The second and third sections provide full project descriptions from the Trust's latest issuance (Series 21), organized by the CWSRF and DWSRF programs. The appendices at the end of this report lists all loans by active Green Bond series, and additional information such as the percent of project funding drawn, loan numbers and other relevant information as of July 31, 2019. Readers should note that the main report sections are organized by projects that in some cases were financed by multiple loans spanning multiple series of Green Bonds.

Full project descriptions, in this report, are limited to the Series 21 Green Bonds. For full descriptions of projects financed in Series 18, 19 and 20 please see the 2018 Green Bond Report, the Trust's Annual Reports or the specific bond series official statements. All of these reports and documents may be found on the Trust's website.


WHAT'S THE VALUE OF WATER?
Mornings wouldn't be the same without water.
Most of us never think about how water gets to the tap or where it goes after it swirls down the drain. Luckily, we don't have to. Pumps, treatment plants, and pipes bring us clean water.
But our water systems are aging. They need investment to continue delivering life's most essential resource. We need water to make a cup of coffee and most everything we do in life. All day, every day.
Water—Essential. Reliable. Invaluable.
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Section 1 | **The Trust's Green Bond Process**

Since 2015, the Trust has issued over $806.8 million of its bonds as Green Bonds in compliance with the federal Clean Water Act and the Safe Drinking Water Act. The Bonds were issued to finance 236 loans for 195 water infrastructure projects through the CWSRF and DWSRF programs. These projects protect public health, protect valuable aquatic resources, and support local businesses while also ensuring that vital infrastructure meets environmental and health standards.

Green Bonds Issued			
Series	**Year**	**Issue Amount**	**Total Loans**
Series 18	2015	$228,155,000	81
Series 19	2016	$207,805,000	66
Series 20	2017	$207,350,000	51
Series 21	2018	$163,460,000	38
	Totals	**$806,770,000**	**236**

Frequently Asked Questions

Q. Are Green Bond Proceeds Separated from Traditional Bond Proceeds?

Yes, all Green Bond proceeds are deposited into segregated Clean Water and Drinking Water accounts within the Project Fund for each individual series of bonds. The accounts are individually tracked for each project internally at the Trust and MassDEP. If it is determined that a project no longer needs loan proceeds that have been permanently financed with bonds, the remaining bond proceeds will be reallocated to additional green projects. Those new projects will be included in the Green Bond reporting.

Q. How Often Will the Trust Prepare Green Bond Reports?

The Trust will track the progress of projects and use of proceeds in its Annual Report along with this Green Bond report. The Trust will report on the bonds until the proceeds have been fully expended.

Q. Where Can I Find Your Green Bond Reports?

You may find this and previous reports in the *Investor Resources* section of the Trust's website. The Trust also posts all annual reports and this report to the MSRB's EMMA website, attached to their associated CUSIPs.

Q. Do You Make Use of Third-Party Opinions or Other "Green Certifications"?

Not at this time. The Trust is in regular dialogue with investors and groups active in the green space. Based on continued and consistent feedback, due to our repeat-issuer status and robust reporting regimen, we have determined that third-party opinions are not necessary for our issuances. The Trust reports on the selection of projects, management of proceeds and use of proceeds following a bond sale. The Trust is committed to full disclosure and will continue to monitor the market and make any necessary changes to our approach as needed.

Project Selection

The Trust's loan process is dictated by an annual list of projects the Trust commits to finance called the Intended Use Plan (IUP). MassDEP compiles two IUPs annually, one for each SRF program.

Project eligibility is determined by the Clean Water Act and Safe Drinking Water Act for the CWSRF and DWSRF respectively. Projects that apply for financing are selected during an annual solicitation process. MassDEP engineers review detailed project specifications and rank them using an established set of criteria that measures the severity of the problem, the sensitivity of the environmental hazard, the public health risk, and the appropriateness of the proposed solution.

For CWSRF projects, the program emphasizes watershed management priorities, stormwater management, green infrastructure, and encourages communities to undertake projects with meaningful water quality and public health benefits. DWSRF projects emphasize compliance with federal and state water requirements to protect the public health while addressing the Commonwealth's drinking water needs. MassDEP compiles the annual IUPs using this rigorous selection process that establish the Commonwealth's priorities for the upcoming year.

Project Categories

The SRF programs fund a wide range of projects. Eleven categories of projects are eligible to receive CWSRF assistance and six categories are eligible to receive DWSRF assistance. For the purposes of this report, the Trust has consolidated similar and related categories and omitted categories with no current projects to streamline the report's contents. Below the Trust has provided an overview of the categories listed within this report.

Wastewater Treatment Projects

These projects involve the maintenance, upgrade or construction of wastewater treatment facilities. A wastewater treatment facility receives all the sewage from a municipality or utility district service area and treats the water before releasing it back into the environment in accordance with National Pollutant Discharge Elimination System permits. The goal of these projects is to reduce or eliminate pollutants and nutrients found in wastewater for cleaner water ways.

Infiltration/Inflow (I/I) and Sewer System Rehabilitation Projects

These projects involve removing infiltration and inflow (i.e. water other than wastewater) from a sewer system, including construction associated with I/I rehabilitation. I/I is when groundwater or stormwater enters a dedicated wastewater or sanitary sewer system either by direct connections or through damaged parts of sewer pipes. I/I increases the flow to wastewater treatment facilities and leads to back-ups or overflows of the system. Sewer system rehabilitation and I/I correction projects are concerned with removing sources of water that are either illicitly being added to a sewer system, or, from sources entering via defective pipes or manholes. Eliminating I/I and replacing sewer systems reduces the occurrences of overflows, meaning less untreated wastewater is released into the environment.

Collector and Interceptor Sewer Projects

These projects involve the physical conveyance of wastewater. Collector sewers gather wastewater from the source, and interceptor sewers convey wastewater to a treatment facility. Extending capacity in an existing sanitary sewer system can help mitigate issues in communities that have insufficient infrastructure to meet local demand. These projects are generally implemented in conjunction with other project categories; such as combined sewer overflow correction which separates stormwater and wastewater collection systems to reduce untreated water being released into surface water bodies.

Combined Sewer Overflow Correction Projects

These projects involve the reduction of untreated water discharged from combined sewer systems. Combined sewer systems are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. During wet weather events, the combined sewer systems can reach capacity and the excess overflows into surrounding waters, creating a combined sewer overflow (CSO). CSO correction projects work to reduce the amount of untreated water discharged from combined sewer systems. The elimination of CSOs is an EPA and Commonwealth priority goal that will reduce the amount of untreated wastewater that is released into the local environment.

Planning Projects

These projects involve developing plans to address water quality and related public health problems. Infrastructure management tracking, capital investment schedules, and the adoption of best management practices are also objectives. For example, comprehensive wastewater management plans provide strategies for addressing wastewater treatment and disposal issues in a city or town. Integrated municipal stormwater and wastewater resource management planning assists municipalities with meeting requirements that arise from distinct wastewater and stormwater programs. Fiscal sustainability and asset management planning assists communities with maintaining replacement schedules and forecasting capital needs.

Drinking Water Treatment Projects

These projects involve the upgrade, maintenance and construction of water treatment facilities. These projects are meant to improve the overall quality of drinking water and are targeted at removing specific pollutants that are known health risks. Treatment plant upgrades can impact the overall efficiency of a plant's energy consumption. Replacing equipment at the end of its useful life will improve overall system efficiency. New pumping and filtering equipment are designed with energy efficiency in mind.

Drinking Water Transmission and Distribution Projects

These projects involve the infrastructure that brings raw water to treatment facilities and the infrastructure that conveys treated water for consumption. This includes everything from large transmission mains from reservoirs to the service lines that provide treated water to homes and businesses. Lines at the end of their useful life can lead to inefficiency in water transmission. Older pipes, made of lead or cast iron, can be severe health risks when corrosion occurs. Upgrades to pumping and booster stations make the transmission process more energy efficient and improve the overall efficiency of the system.

Drinking Water Source and Storage Projects

These projects involve two different categories. Source water projects are related to untreated water sources – such as rehabilitating surface water in a reservoir or drilling and maintaining wells. Storage projects deal with infrastructure for maintaining and storing treated water before it is distributed into a system.

Drinking Water Planning and Design Projects

These projects involve the activities needed to plan design and/or study drinking water infrastructure. Such projects are essential for maintaining and improving the key infrastructure that protects public health and water quality.

Project Funding

The Trust, MassDEP and EPA have entered into a Revolving Fund Operating Agreement for the CWSRF and the DWSRF. These agreements establish rules, procedures and activities to be followed by the EPA and the Commonwealth in administering federal grants. To date, the Trust has been awarded approximately $1.5 billion in federal grants and $275.6 million in state matching funds for the CWSRF program. Approximately $525.8 million in federal grants and $94.7 million in state matching funds have been awarded to the DWSRF program. Additionally, the Commonwealth appropriated an additional $30 million for funding or securing financing solely for local community septic management programs.

WHAT'S THE VALUE OF WATER?

Splashing in a pool, tossing a water balloon—water is one of life's great pleasures.

Most of us never think about how water gets to us or where it goes when it swirls down the drain. Luckily, we don't have to. Pumps, treatment plants, and pipes bring us clean water and remove wastewater.

But our water systems are aging. They need investment so they can continue to deliver life's most precious resource. All day, every day.

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Section 2 | **Clean Water State Revolving Fund Projects**

Wastewater Treatment Projects

Wastewater treatment projects are eligible for SRF assistance under the Clean Water Act for facilities that provide, or are being upgraded to provide, secondary or advanced wastewater treatment. The distinction between secondary and advanced treatment projects is essentially the level of pollutant removal. For example, secondary treatment requires that a 5-day Biochemical Oxygen Demand (BOD5) be less than 30 milligrams per liter (mg/l). BOD5 is the amount of dissolved oxygen needed by organisms to break down organic materials present in a water sample over a period of 5 days and is listed as a pollutant under the Clean Water Act. Advanced treatment requires that the BOD5 level be less than 20mg/l. Advanced treatment facilities also address nitrogen, phosphorous, ammonia, metal and/or synthetic organic removal.

Water treatment facility upgrades or improvements can vary widely depending on the age of the infrastructure in question. These facilities are governed under National Pollutant Discharge Elimination System (NPDES) permits, which determine the level of water treatment required to discharge wastewater. Many of the upgrades financed by the Trust help facilities meet their NPDES requirements. These upgrades could include replacing inefficient mechanical equipment, upgrading pollutant removal systems or updating water storage facilities to reduce odor. Replacing equipment at the end of its useful life will improve overall system efficiency. New pumping and filtering equipment are designed with energy efficiency in mind.

Highlighted Project

Uxbridge | Wastewater Treatment Facility and Infrastructure Upgrade - $17,253,299

The Town of Uxbridge operates a wastewater treatment facility (WWTF) which was constructed in 1979. The only upgrade to the facility was the installation of a lime tower in 2007. Because treatment effluent is discharged to the Blackstone River and the receiving water is the Narragansett Bay, the facility is governed by EPA's NPDES permit. The Town was placed under an EPA consent order in June 2014. Negotiations between Uxbridge, MassDEP and EPA gave the Town until 2020 to come into full compliance with the permit. To meet the 2020 deadline requirements that town has implemented a number of system improvements.

Uxbridge has Added a Multi-Stage Biological Nutrient Removal (BNR) process as an advanced treatment configuration to remove additional nitrogen and phosphorus from discharged water. The physical facility has been renovated and overhauled, including replacing heating, ventilation and air condition (HVAC), electrical components and generators and upgrading the septage receiving building and mechanical equipment to be more efficient. Additionally, this project replaced existing the chlorination system with an ultraviolet (UV) disinfection system, equipment in the sludge holding tank and sludge pumping station, the existing gravity thickener and constructing a new gravity thickener and installing a larger capacity tank.

Borrower	Project Description	Amount
Fitchburg	**FITCHBURG WASTEWATER TREATMENT FACILITY SECONDARY SYSTEMS UPGRADE** The Fitchburg Easterly Wastewater Treatment Facility is a secondary treatment facility with current average annual flows of about 9.8 million gallons a day. This project included elements intended to improve the facility's discharge permit compliance. These included: upgrades to the secondary treatment system with a biological selector zone to increase peak flow capacity, provided biological nutrient removal; replaced existing primary and secondary sludge pumps, aeration blowers, pipes, valves, fine bubble diffuser, clarifier mechanisms, surface repairs to existing concrete aeration and clarifier tanks; installation of two new emergency generators; and instrumentation and electrical improvements; and modifications to the existing flood protection berm.	$9,017,418
MFN Regional Wastewater District	**WATER POLLUTION CONTROL FACILITY UPGRADES AND LANDFILL CLOSURE** From 1986 to 2010, the Town of Mansfield disposed of grit and sludge from the Mansfield, Foxborough, Norton Water Pollution Control Facility (WPCF) at its Fruit Street Landfill site. Grit and sludge were disposed of elsewhere. The District planned to cap and close the landfill site in accordance with applicable MassDEP regulations. Properly capping the landfill reduced leachate generation, reduced odors, and reduced potential storm water runoff contamination. The project included construction for expanding and upgrading the WPCF so that the District could operate at 4.14 million gallons per day capacity and comply with updated National Pollutant Discharge Elimination System (NPDES) limits. The project also ended the Fruit Street Sludge Landfill program.	$17,911,611
Massachusetts Water Resources Authority (MWRA)	**WASTEWATER TREATMENT PLANT AND SEWER IMPROVEMENTS** This project included upgrades to the Deer Island Wastewater Treatment Plant automation and central control systems. In addition, the project improved and upgraded several existing interceptors and pump stations that were in need of replacement and/or modernization. The project extended current asset life and improved system operability.	$6,644,192
MWRA	**CLINTON WASTEWATER TREATMENT PLANT PHOSPHOROUS REMOVAL** After extensive alternative analysis and pilot testing, the MWRA has determined that disk filter technology is the best feasible alternative for meeting the current and upcoming discharge phosphorous concentration limits at the wastewater treatment plant (WWTP) in the Town of Clinton. This project installed a full-scale disk filter phosphorous removal system at the WWTP. This helps ensure compliance with National Pollutant Discharge Elimination System (NPDES) discharge permit limits.	$3,759,927

Borrower	Project Description	Amount
Nantucket	**SURFSIDE WASTEWATER TREATMENT FACILITY IMPROVEMENTS** In 2009, the Surfside Wastewater Treatment Facility underwent major a renovation including a treatment capacity upgrade from 2.24-million gallons per day (MGD) to 3.5-MGD (7.7 MGD peak), rehabilitation and expansion of groundwater disposal beds, and modifications to provide for higher nitrogen removal capacity. This project proposed further enhancements to both equipment operating procedures for providing the following improvements: 1) Reliability: corrosion control, enhanced influent screening to preserve Membrane Bioreactors (MBRs), MBR inspection and replacement, instrumentation and supervisory control and data acquisition (SCADA) improvements. 2) Energy Efficiency: sludge blower cycling, piping modifications, odor control fan variable frequency drive (VFD), and MBR optimization. 3) Capacity: blower addition, nitrified recycle system.	$8,472,975
Upper Blackstone Water Pollution Abatement District	**NUTRIENT REMOVAL IMPROVEMENTS** The Upper Blackstone Water Pollution Abatement District (UBWPAD) is currently under Administrative Order on Consent (AOC) with the EPA to comply with the 2012 National Pollutant Discharge Elimination System (NPDES) permit limits for total nitrogen and total phosphorus levels. The construction project upgraded the treatment facility to meet these nutrient limits, including the construction of a tertiary phosphorus removal system, secondary system improvements, sludge handling and chemical system improvements. There were also numerous ancillary systems and site improvements.	$8,842,079
Uxbridge	**WASTEWATER TREATMENT FACILITY BNR AND INFRASTRUCTURE UPGRADE** *Highlighted Spending Project*	$17,253,299

Infiltration/Inflow (I/I) and Sewer System Rehabilitation Projects

These projects correct sewer system infiltration and inflow problems. Infiltration includes water (usually groundwater) penetrating a sanitary or combined sewer system from the ground through defective pipes or manholes. Inflow includes controlling the penetration of water (usually stormwater) into a system from sump pumps, drains, storm sewers, and other improper entries.

Sewer system rehabilitation projects maintain, reinforce, or reconstruct deteriorating or undersized sewer systems. The corrective actions are necessary to maintain the functional integrity of the system.

Highlighted Project

Quincy | Quincy Point Pump Station Renovation - $3,634,026

The Quincy Point Pump Station was built in 1971 and renovated in 1985. The purpose of this project was to address aging infrastructure which included the replacement of three 100-horse power (HP) two-speed pumps with two new 125-HP pumps controlled by variable frequency drives (VFD). The new VFD pumps are more energy efficient than the two speed pumps they replaced. The station's channel grinder and wet well mixing components were upgraded to reduce the accumulation of fats, oils and grease on the water surface.

A new odor control unit utilizing granular activated carbon was added, as well as a new Supervisory Control and Data Acquisition system. An older underground fuel storage tank was removed, and a new standby generator was added in addition to significant Heating, ventilation, and air conditioning (HVAC) updates. Architectural, wiring and plumbing improvements greatly improved the overall efficiency of the station. New air release valves and corrosion control for the 20-inch ductile iron force main and heavy cleaning of linked sanitary sewers have improved the longevity of this vital facility.

Borrower	Project Description	Amount
Brockton	**SEWER REHABILITATION PROJECT** The Taunton River watershed has water quality impairments during both wet and dry weather conditions due to bacteria pollution. The causes include sewerage exfiltration, stormwater discharges, illicit connections to the drainage system, and failing septic systems. This sewer rehabilitation project included repair of prioritized areas in the City's wastewater collection system to address sources of exfiltration, infiltration, inflow, and sections of undersized pipe. The work included open cut repairs, cured-in-place (CIP) sewer pipelining, and rehabilitation of manholes. These projects were identified based on the Illicit Discharge Detection and Elimination program, the existing sewer system evaluation study and capacity evaluations.	$2,975,722
Montague	**PUMP STATION REPLACEMENTS** The main objective of the Montague Pumping Station Replacement Project was to mitigate the potential environmental impacts and make the Town's wastewater infrastructure safer and more reliable. All eight wastewater pumping stations, some of which dated back to 1962, were replaced. Mechanical components of the pumping stations were beyond their useful life and replacement was the only option. Replacing the pumping stations improved operator safety by eliminating confined space entry. Electrical efficiency was improved by using variable frequency drives, efficient motors and smart controls. Monitoring was improved through connection to the supervisory control and data acquisition (SCADA) system at the wastewater plant. Operating costs were also reduced.	$1,583,047
MWRA	**CARUSO PUMP STATION** The Caruso Pump Station Improvements Project was one of four critical wastewater system improvements projects that the Massachusetts Water Resources Authority (MWRA) had identified. The purpose of the Caruso Pump Station Improvements Project was to replace the standby power generator system and to improve the heating, ventilation, and air conditioning (HVAC), fire detection/suppression, and security systems. This significantly improves the pump station's reliability, operations, safety and efficiency.	$2,194,852
MWRA	**REMOTE HEADWORKS UPGRADE** The Massachusetts Water Resources Authority (MWRA) has three remote headworks - Chelsea Creek, Columbus Park, and Ward Street - which were built and placed into operation in the 1960's. All wastewater flows from the MWRA Northern Service Area, gets collected at the remote headworks, and is then conveyed to the Deer Island Treatment Plant. Preliminary treatment and flow control are performed at the remote headworks facilities. This project addressed aging infrastructure and improved operational reliability by replacing all mechanical, electrical, heating, ventilation, and air conditioning, plumbing, and appurtenant equipment at all three facilities.	$4,786,700

Borrower	Project Description	Amount
Norwood	**UNDERDRAIN AREA SEWER REHABILITATION** The project consisted of a variety of planning measures associated with operation and maintenance of the sanitary sewer and stormwater systems. Work included elements such as infiltration and inflow investigations, sewer system evaluation surveys, development of Capacity, Management, Operation and Maintenance (CMOM) programs, compliance with Phase 2 National Pollutant Discharge Elimination System Stormwater regulations including the implementation of programs, mapping of systems, development of geographic information systems, sampling of outfalls, performing illicit discharge detection programs and all other related work.	$414,356
Quincy	**PUMP STATION RENOVATION** *Highlighted Spending Project*	$3,634,026
Saugus	**SEWER SYSTEM AND PUMP STATION REHAB/IMPROVEMENTS** This project involved the rehabilitation of pipelines, manholes, and the removal of private inflow sources to eliminate infiltration/inflow (I/I) from the sewer system. The project aimed to significantly reduce or eliminate sewer system overflows from occurring at the Lincoln Avenue Pumping Station. Approximately 34,000 feet of 8-inch and 12-inch pipe and 1,500 feet of 15-inch pipe was rehabilitated using cured-in-place pipe lining. Approximately 865 sewer services and 222 manholes were lined as part of the project. The replacement of the existing Morris Place pump station and improvements to the Bristol Street pump station was completed. The equipment within many of the Town's wastewater pump stations was operating beyond its useful life and exhibited signs of failure in some cases. Replacing the existing Morris Place Pump Station was required due to the poor structural conditions, the need to restore useful life and the station's proximity to environmental receptors. Improvements to the Bristow Street Pump Station were required to restore the useful life of the station, improve operator safety, alleviate flooding concerns and improve system reliability.	$3,197,219
Taunton	**SEWER/DRAIN SEPARATION AND INFLOW REMOVAL** The project installed new drains to facilitate sump pump removal, and improvements and repairs to the existing sewer and Stormwater systems. The objective of this project was to further reduce wastewater-related water pollution to the Taunton River and other waterways by removing infiltration and inflow (I/I) from the sanitary collection system, with the ultimate goal of reducing and eliminating Combined Sewer Overflows. This project focused primarily on installing drains necessary to re-route private inflow sources (sump pumps and roof leaders) away from sanitary sewers. In addition, work continued to separate combination manholes, reducing the potential for infiltration to enter the sewer system.	$3,927,054

Collector and Interceptor Sewers Projects

According to the EPA, millions of gallons of human and industrial waste are sent through complex underground collections systems. These systems operate all day, every day and most municipal sewer systems are at least 60 years old. Many communities have sewers that are more than 100 years old. Collection systems consist of pipelines, conduits, pumping stations, force mains and other components to collect wastewater and convey it to treatment facilities before being discharged into the environment. Design, operation and maintenance are critical for system efficiency and public health. System expansions can be used to mitigate issues with combined sewer overflows and septic systems.

New Collector Sewers

These are projects associated with new pipes used to collect and carry wastewater from a sanitary or industrial wastewater source to an interceptor sewer that will convey the wastewater to a treatment facility.

New Interceptor Sewers

These are projects for constructing new interceptor sewers and pumping stations that convey wastewater from collection sewer systems to a treatment facility or to another interceptor sewer. This category includes costs for relief sewers, which are designed to handle the excess capacity of an existing system.

Highlighted Project

Nantucket | Shimmo and PLUS Parcels Sewer Extension – $14,101,765

The town will be sewering the highest rated needs area in the town that will lead to environmental improvements in Nantucket Harbor. These areas are contributing to the nutrient loading in the harbor through the use on-site septic systems. The Massachusetts Estuaries Project (MEP), created to help identify and provide solutions for nutrient loading, provided data to MassDEP to help establish the total maximum daily loads (TMDLs) for the area. In 2006, MEP reported that septic system reduction could greatly reduce nutrient enrichment and degradation of the Nantucket Harbor Watershed and increase the water quality.

A 2014 MassDEP-approved comprehensive wastewater management plan (CWMP) update identified the town areas of Nantucket Harbor Shimmo and Nantucket planning and land use services (PLUS) needs areas as the highest rated needs areas. Both needs areas are within the Nantucket Harbor Watershed and contribute nutrient load to the Harbor via septic systems. The CWMP recommended that the Town collect, treat and discharge the wastewater from these two adjacent needs areas at the Town's Surfside Wastewater Treatment Facility (WWTF).

The project will connect these needs areas with the Surfside WWTF through a hybrid approach of gravity sewers and low-pressure sewers. The entire sewer extension consists of approximately 46,000 linear feet of new gravity, low-pressure, and force main sewers and appurtenances; individual on-lot grinder pumps; and one wastewater pump station. This project will connect 161 properties to the wastewater system.

Borrower	Project Description	Amount
Nantucket	**SHIMMO & PLUS PARCELS SEWER EXTENSION** *Highlighted Spending Project*	$14,101,765

Combined Sewer Overflows Correction Projects

Combined Sewer Overflows (CSO) are events where a combined sewer system fails to collect rainwater, domestic sewage and industrial wastewater in the same pipe as intended. When these systems exceed their capacity, untreated water can discharge directly into a water body. CSOs are a major source of water pollution for approximately 772 cities in the US that have combined sewer systems. CSO Correction projects are associated with measures used to achieve water quality objectives by preventing or controlling periodic discharges that occur when the capacity of a sewer system is exceeded during a wet weather event.

Highlighted Project

Fitchburg | Beech and Hazel Streets Sewer Separation - $2,068,695

The City of Fitchburg owns and operates a 12.4 million gallons per day advanced publicly owned treatment works (POTW) fed by its wastewater collection system incorporating about 130 miles of sewers; fourteen of these miles combine sanitary and storm water flows. In 2012, Fitchburg fell under an EPA Consent Decree (CD) for violating their National Pollutant Discharge Elimination System (NPDES) permit which regulation the discharge of pollutants into surface water. Following the terms of the CD, the City began completing separation projects.

The Hazel Street Separation Project was required after another combined sewer was closed causing the overflow to exceed the capacity of the 12-inch pipe. This project consisted of separating approximately 5,200 linear feet of combined sewers in the Beech Street and Hazel Street areas. This was achieved by installing new storm drains and catch basins; repairing and rehabilitating existing sewers and manholes, removing illicit connections; and general street improvements.

Borrower	Project Description	Amount
Fall River	**COMBINED SEWER OVERFLOW ABATEMENT PROGRAM** The objective of this project was to lessen combined sewer overflows (CSOs) in Fall River to achieve compliance with state and federal CSO regulations and a federal court order. The work involved the construction of CSO controls for the President Avenue CSO outfall and other CSO outfalls to the Taunton River and Mt. Hope Bay. This project was part of a multi-year undertaking. Planned CSO control projects included several additional CSO screening and disinfection facilities along with sewer separation projects. The City of Fall River had a combined system with 19 CSO outfalls that discharged to the Mt. Hope Bay, Taunton River or Quequechan River. These CSO outfalls discharged untreated stormwater runoff and sewage during wet weather into receiving waters.	$487,150
Fall River	**GLOBE STREET SEWER IMPROVEMENTS PROJECT** The Globe Street sewer improvements included upsizing approximately 720 linear feet of combined sewer from 33-inches to 66-inches. The work stretched from Globe Four Corners to the combined sewer overflow (CSO) tunnel junction chamber on Globe Street. Upsizing the sewer to the CSO tunnel junction chamber allowed combined sewage to flow unobstructed to the CSO Tunnel drop shaft, eliminating the conveyance restriction that caused flooding, surcharging and combined sewer backups at Globe Four Corners.	$4,105,174
Fitchburg	**BEECH AND HAZEL STREETS SEWER SEPARATION** *Highlighted Spending Project*	$2,068,695

Planning Projects

Projects in this category are for developing plans to address water quality and water quality-related public health problems. Planning projects can consist of multiple types of investigations. Field investigations are used to view the state of current water infrastructure assets to identify and prioritize design, maintenance and replacement activities. Sensor and field analysis can be used as part of a larger analysis that consists of plans to adopt best management practices and capital improvements. These projects assist municipalities with determining environmental issues that may be affecting local water sources or endangering public health.

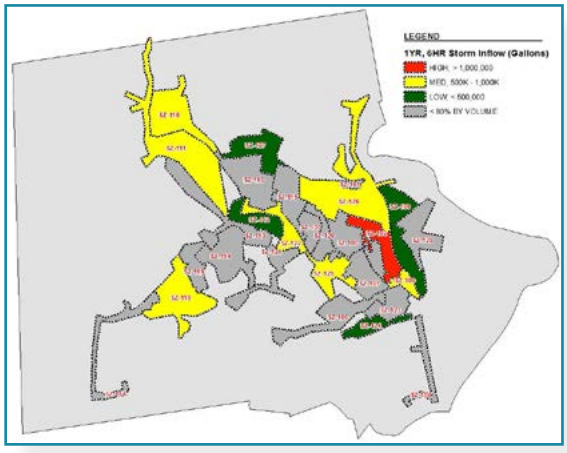
For example, comprehensive wastewater management plans provide strategies for addressing wastewater treatment and disposal issues in a municipality or utility district. Integrated municipal stormwater and wastewater resource management planning assists municipalities with meeting requirements that arise from distinct wastewater and stormwater programs. Fiscal sustainability and asset management planning assists communities with maintaining replacement schedules and forecast capital needs in the future.

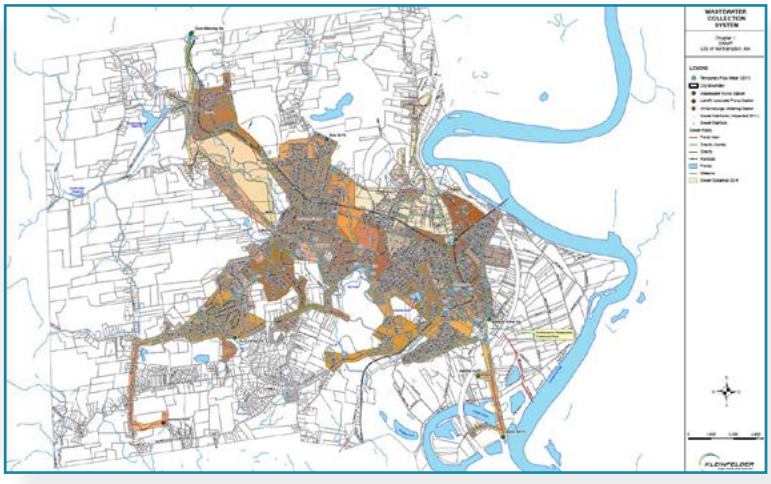
Highlighted Project

Northampton | Comprehensive Wastewater Management Plan - $86,222

In 2012 the City of Northampton commissioned a comprehensive evaluation of needs for its wastewater collection system and wastewater treatment facility (WWTF). This analysis was compiled into a Comprehensive Wastewater Management Plan (CWMP). The Comprehensive Wastewater Management Plan (CWMP) allows the City of Northampton to proactively plan for, fund, and implement necessary capital improvements and/or administrative practices related to their wastewater collection and treatment system. The city has not developed a comprehensive plan to assess and evaluate the condition of its 113 miles of sewers (some of which are more than 100 years old), pumping stations, and treatment facility.

The CWMP included a data management plan, an Infiltration/Inflow study, an hydraulic model simulation to identify existing or potential capacity deficiencies, a wastewater treatment plant evaluation, an alternatives analysis that identifies potential preferred solutions that include energy and environmental goals developed through the 2008 Sustainable Northampton Comprehensive Plan, a sludge/energy efficiency study, a long term operations and maintenance program, and a capital improvement plan. The final plan was delivered in May of 2016.





Borrower	Project Description	Amount
Medway	**INTEGRATED WATER RESOURCE MANAGEMENT PLAN** This project developed a town-wide integrated water resource management plan (IWRMP). The IWRMP allowed the Town to proactively plan, fund, and implement necessary capital improvements and/or administrative practices. These proactive measures ultimately benefited the Town's water treatment & distribution system, wastewater collection & treatment system, and stormwater management system.	$500,000
New Bedford	**SUPPLEMENTAL WASTEWATER AND STORMWATER PLAN** The City is facing many challenges over the next several years related to regulatory compliance associated with stormwater, National Pollutant Discharge Elimination System (NPDES) permitting, and the EPA's Administrative Order (AO). To effectively plan and manage these requirements, the City implemented an integrated wastewater and stormwater management plan. This plan developed a comprehensive approach to managing regulatory and AO requirements in a fiscally responsible manner while meeting the needs of the community, the EPA, and MassDEP. The Supplemental Integrated Wastewater and Stormwater Plan was developed to support ongoing planning efforts in the development of an integrated wastewater and stormwater management plan. Those efforts were necessary to maintain compliance with the AO.	$1,000,000
Northampton	**COMPREHENSIVE WASTEWATER MANAGEMENT PLAN** *Highlighted Spending Project*	$86,222
Revere	**ILLICIT CONNECTIONS & SUMP PUMP DETECTION** The illicit connections and sump pump detection program was and is important for the City's efforts to remove inflow from the sanitary sewer system. This program continued the inspections of private homes and businesses so that sources of inflow from sump pumps, roof leaders, roof drains, driveway drains, yard drains, etc. could be identified.	$850,000
Revere	**PHASE VIII FIELD INVESTIGATIONS - I/I AND IDDE** The Phase VII Field Investigations and illicit discharge detection and elimination (IDDE) was vital for the City to plan and assess wastewater and stormwater systems. The field investigations included IDDE, closed circuit television inspection of drains and sewers, dye testing, smoke testing, and private building inspections. The deficiencies discovered in the system during the investigations will be addressed and corrected by the City in future construction projects.	$1,500,000

WHAT'S THE VALUE OF WATER?

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Section 3 | **Drinking Water State Revolving Fund Projects**

Drinking Water Treatment Projects

Treatment projects include the construction, expansion, and rehabilitation of drinking water infrastructure that reduces contamination through various treatment processes. Such processes include conditioning water or removing contaminants. Treatment processes include filtration of surface water, pH adjustment, softening, disinfection, waste handling and other treatment needs (i.e., granular activated carbon which filters out chemicals, particularly organic chemicals, aeration, iron/manganese removal) along with chemical storage tanks.

Upgrades and maintenance to water treatment plants leads to improved water quality and system efficiency. Replacing equipment that has reached the end of the its useful life along with upgrading filtering and purifying equipment makes these facilities less susceptible to failures that could endanger public health. Additionally, system improvements such as corrosion control, help keep the public safe from issues related to older cast iron pipes and lead service lines. Upgraded equipment generally leads to more efficient facilities that consume less power and improves worker safety.

Highlighted Project

Shrewsbury | Home Farm Water Treatment Facility Upgrade - $12,074,031

The Shrewsbury Home Farm Water Treatment Facility, constructed in 1989, receives water from Shrewsbury's 8 wells. Like many New England groundwater sources manganese is present but appears in higher concentrations than guidelines provided the EPA and MassDEP's Office of Research and Standards Guidelines (ORSG) manganese regulations. To this end, the Town of Shrewsbury authorized a number of pilot programs to test filtering options to filter out manganese.

The Town, in September of 2016, voted to build a biological manganese filtration facility and refurbish six of eight groundwater supply wells with new pumps, motors and motor control centers to match the new pump head conditions. In a December 2018 update from the Shrewsbury Water Department noted that, "samples taken throughout the system weekly confirm that manganese levels are at zero or near zero at all sites."

Borrower	Project Description	Amount
Chatham	**NEW WATER TREATMENT FACILITY** This project is for building a drinking water treatment facility and protecting drinking water sources from high levels of iron and manganese. Wells 6, 7, and 9 need treatment for iron and manganese. Chatham has a total of 7 wells. Wells 6 & 7 are run during the summer to meet peak demands. If any wells are offline, the remaining wells are operated on a schedule that is not sustainable.	$9,274,815
Haverhill	**HAVERHILL WATER TREATMENT PLANT UPGRADES** The Haverhill Water Treatment Plant had provided the City with service beyond its useful life. Critical components were aging and approaching obsolescence, with acquisition of replacement parts difficult or impossible. This project upgraded treatment capacity from approximately 10-million gallons per day (MGD) to 12.1 MGD providing much needed redundancy of primary treatment components and replaced outdated systems. The updated plant will meet the needs of the City under a variety of existing and future conditions.	$8,645,659
Shrewsbury	**HOME FARM WATER TREATMENT FACILITY UPGRADE** *Highlighted Spending Project*	$12,074,031

Drinking Water Transmission and Distribution Projects

These projects are for installing, replacing, or rehabilitating transmission lines that carry drinking water from the source to the treatment plant or from the treatment plant to the consumer. Items such as pipes for raw and finished water transmission, service lines, valves, backflow prevention, water meters, and pumping stations may be components of these projects.

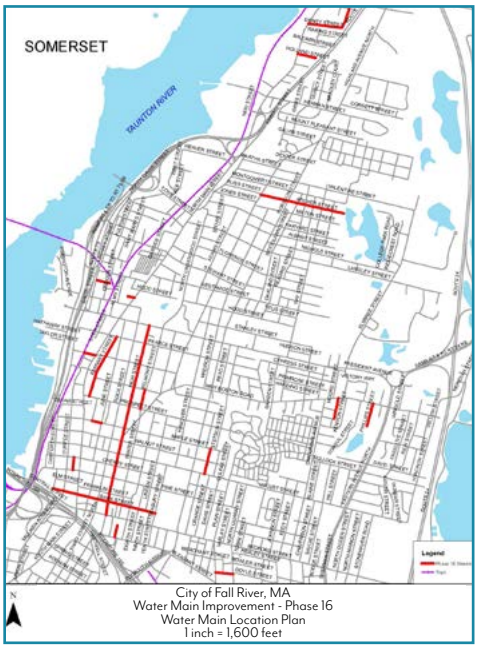
Replacing or repairing transmission lines improve water quality, system pressure and reliability. Additionally, the replacement and relocation of lines may be needed to improve the overall efficiency of a system that was designed for a smaller and less expansive community. The older practice of grouping transmission lines can lead to water distribution issues if one begins to leak and causes physical damage to the surrounding soil and adjacent transmission lines. Replacement of lead service lines reduces the risk of lead exposure and removes a public safety risk.

Highlighted Project

Fall River | Phase 16 Water Main Improvements - $3,512,338

In 2001, the City of Fall River Water Department utilized the Infrastructure Rehabilitation Program and started an aggressive cast iron water main replacement program, with the initial goal of replacing 42 miles of pipe over the course of seven years. In 2006, the City began to focus on replacing lead services along with the cast iron water mains, using the amount of lead services lines in a particular area as part of the selection criteria.

The City entered the sixteenth year of its Replacement Program. Phase 16 water main improvements included the rehabilitation or replacement of approximately 16,500 linear feet of cast iron water mains and 106 lead service lines. The goal was to eliminate potentially serious and preventable health threats such as lead contamination. This project also aimed to provide safe and reliable drinking water to residents.



Existing 12" Cast Iron main on Hartwell Street

Borrower	Project Description	Amount
Adams Fire District	**WELL 4 PUMP STATION REHABILITATION** The goal of this project was to rehabilitate the Well 4 Pump Station, where the pumping, electrical and mechanical equipment had exceeded its useful life. The benefits of this project included increasing safety for workers, reducing the risk of supply interruptions to its customers, and assisting the district in compliance with the Water Management Act. The project involved the following major components: removal and replacement of outdated pumping and chemical feed; updating of heating, ventilation, and air conditioning (HVAC) and electrical equipment; building upgrades to meet current building codes; energy efficiency measures; addition of a supervisory control and data acquisition (SCADA) system; replacement of discharge piping; and the addition of an access vault to the venturi meter.	$538,518
Fall River	**WATER MAIN IMPROVEMENTS AND WATER TREATMENT PLANT RESIDUAL HANDLING** The project included the replacement of approximately 19,000 linear feet of cast iron water mains and 19 lead service lines. A new sanitary grinder pump station was installed for the discharge of domestic sewage from the City's water treatment plant and the replacement of the residuals pump station & associated electrical and control systems.	$139,747
Fall River	**WATER MAIN IMPROVEMENTS - PHASE 16** *Highlighted Spending Project*	$3,512,338
Hadley	**WATER INFRASTRUCTURE IMPROVEMENT** To improve water system reliability, the Town planned to address existing system deficiencies. There was a water main that was approximately 100 years old on the north side of Russell Street. Failures within the project area averaged two per year and created loss of water service and traffic disruptions. Remnants of pipe removed during repairs showed severe tuberculation and customers connected to the main reported low pressure. The project addressed ongoing service interruptions, low pressure complaints, and may have helped to reduce the system's unaccounted water, which exceeded the Water Management Act limit of 10%.	$172,998
Haverhill	**TRANSMISSION MAIN IMPROVEMENTS** This project included improvements for the Kenoza Lake Water Treatment Plant and within the distribution system to provide redundancy to the Gale Hill Storage Tank and the distribution system. The project also included rehabilitating an existing 20-inch transmission main to increase capacity, re-establish isolation control and provide redundancy in the distribution system. Water systems that lack redundancy are at risk for prolonged loss of service if a single critical system element falls out of service.	$2,549,127

Borrower	Project Description	Amount
MWRA	**WACHUSETT AQUEDUCT PUMP STATION** This project was for the construction of an emergency pump station from the Wachusett Aqueduct to the Carroll Water Treatment Plant (CWTP). The pump station provides redundancy in the event of failure at the Cosgrove Tunnel or Intake and for the inspection/rehabilitation of the Cosgrove Tunnel. The pump station can deliver 240 million gallons per day of raw water to the CWTP during a planned or emergency shutdown of the Cosgrove Tunnel. This flow rate represents the full water demand from CWTP during the fall, winter, and spring low-flow seasons and mitigates potential disruption of service to Northborough, Southborough, Marlborough, and Westborough State Hospital.	$28,249,352

Drinking Water Source and Storage

These projects are used for developing or improving sources of water used in public water systems. Project costs include those for constructing or rehabilitating surface water intake structures, drilled wells, wellhead pumps and spring collectors. Having multiple sources of raw water is a standard precaution to make sure that water supplies are not endangered or cut off. Source protection and testing are necessary to confirm that raw water quality can be properly purified at the intended water treatment plant. Excessive amounts of toxins or pollutants in raw water can cause efficiency issues once raw water reaches a water treatment plant. Pumping, well maintenance and water extraction must be monitored to ensure that water quality at the source is not impacted by these activities.

Storage projects in this category aim to provide finished water storage for public water systems. Examples may include systems involving elevated and ground level storage for treated water and covers for existing storage. Storage tanks and the systems they employ are vital components of a water distribution system. Tanks are used to ensure water supply when there may be issues with supply lines or when maintenance is being performed. Upgraded systems that chlorinate water or monitor water quality are more efficient with advanced systems. This means that water quality is more consistent and requires less human maintenance.

Highlighted Project

MWRA | MWRA Low Service Storage - $319,493

Covered distribution storage is vital to large water systems to balance flows during the daily use and to store a reserve supply of treated water to handle unusual or emergency situations such as fires, water main breaks, maintenance activities or other system failures. This project provides improved storage (16-20 million gallons) but will also provide surge relief, protecting MWRA and community mains; allow for more efficient use of the existing MWRA distribution system; and, provide emergency backup to 21 communities in the Northern Intermediate High and Northern High systems.

Borrower	Project Description	Amount
Fall River	**AIRPORT ROAD HIGH SERVICE AREA IMPROVEMENTS** The project aims to create a high service area at the Airport Road Industrial Park. The existing tank will be replaced with a taller tank to improve pressures in the new high service area. A new booster pump station will be constructed. A water main will be replaced and upgraded to connect the new pump station and tank to the existing system.	$428,194
MWRA	**SOUTHERN EXTRA HIGH REDUNDANCY AND STORAGE** The Southern Extra High service area was identified as being deficient in distribution storage and lacking redundant distribution pipelines. Correction of these deficiencies was a majority priority under the Massachusetts Water Resources Authority's (MWRA's) 2006 and 2013 Water System Master plans due to the potential public health threat that could result from a failure in this single transmission main.	$4,045,484
MWRA	**LOW SERVICE STORAGE** *Highlighted Spending Project*	$319,493

Drinking Water Planning and Design Projects

These projects involve the activities needed to plan design and/or study drinking water infrastructure. Planning and design projects are essential for maintaining and improving the key infrastructure that protects public health and water quality. These activities may include using Geographic Information Services (GIS) to map infrastructure, develop asset management plans to better track capital cost and system maintenance. Additionally, these projects may be used to determine system improvement needs related to water loss, emerging contaminants, and numerous other issues that may affect the effectiveness of a system's ability to provide safe drinking water to a community.

Highlighted Project

Revere | GIS Implementation of Automatic Meter Reading Program - $250,000

This project updated the City's geographic information system (GIS) for implementation of an Automatic Meter Reading (AMR) program. This GIS update allows for an efficient digital tracking system to be used during planning and implementation of the program. It will also facilitate the future management of the water utility. In addition, the project implemented a public education program to encourage water conservation, improve customer service and educate the public about the new AMR program.

Borrower	Project Description	Amount
Revere	**GIS IMPLEMENTATION OF AUTOMATIC METER READING PROGRAM** *Highlighted Spending Project*	$250,000

Appendix A - Series 19 Projects

Borrower	Loan No.	Project Name	Amount	Loan Drawn	Program	Category
Andover	CW-11-24	Ledge Road Landfill Closure Planning	$675,000	100%	CW	Planning
Auburn Water District	DW-14-01	West St. Water Treatment Facility Upgrade	$2,688,952	96.4%	DW	Drinking Water Treatment
Barnstable	DWP-13-01	Hyannis Water System Improvements	$2,036,788 [2]	100%	DW	Drinking Water Transmission and Distribution
Bridgewater	CW-14-17	Sewer Inspection, Cleaning and Lining	$781,616 [3]	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Brockton	CWP-14-30	Sewer System Rehabilitation	$1,467,754 [2]	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Cambridge	CWP-13-03-A	Huron B Sewer Separation Project	$14,000,000	93%	CW	Combined Sewer Overflow Correction
Charles River Pollution Control District	CW-13-09-A	Wastewater Treatment Facility Improvements Phase C	$8,741,935	100%	CW	Wastewater Treatment
Chatham	CW-13-10	Collection System Extension and Improvements	$2,881,069 [2]	100%	CW	Collector and Interceptor Sewers
Dracut	CW-13-24	Contract No. 32 Sewer Extensions	$4,693,582	100%	CW	Collector and Interceptor Sewers
Dracut	CWS-08-18-A	Contract 27 Peters Pond West Area Sewers	$19,114	100%	CW	Collector and Interceptor Sewers
Fall River	DWP-13-06	Airport Road High Service Area Improvements	$4,006,171	100%	DW	Drinking Water Transmission and Distribution
Fall River	DWP-14-08	Water Main Improvements and Water Treatment Plant Residual Handling	$3,157,717 [2]	100%	DW	Drinking Water Transmission and Distribution
Fall River	DWP-15-10	Water Main Improvements	$2,219,602 [3]	100%	DW	Drinking Water Transmission and Distribution
Falmouth	CWP-14-23	Sewer Extension and New Recharge Site	$11,140,583	100%	CW	Collector and Interceptor Sewers
Falmouth	DWP-14-04	Long Pond Water Treatment Facility	$16,126,207	100%	DW	Drinking Water Treatment
Falmouth	CWP-14-22	Wastewater Treatment Facility Upgrade	$4,284,956	100%	CW	Wastewater Treatment
Fitchburg	CWP-12-01-A	Combined Sewer Separation	$721,426	100%	CW	Combined Sewer Overflow Correction
Framingham	CW-09-11	Central Street Siphon/Sudbury Interceptor	$2,114,587	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Framingham	CW-09-30-A	Phase 4 Sanitary Sewer Evaluation Survey	$84,190	100%	CW	Planning
Gloucester	DWP-12-02-A	Water Treatment Plant Upgrade	$474,127	100%	DW	Drinking Water Treatment
Great Barrington	CW-12-23	Wastewater Treatment Facility Upgrade and Infiltration/Inflow Removal	$4,210,000	100%	CW	Wastewater Treatment
Harwich	DWP-13-02	Water Treatment Plant	$1,875,541 [2]	100%	DW	Drinking Water Treatment
Holden	DW-13-12	Water Main Installation and SCADA Improvements	$525,000	100%	DW	Drinking Water Transmission and Distribution
Lawrence	DWP-13-05	Water Main Replacement	$9,186,062	100%	DW	Drinking Water Transmission and Distribution
Leominster	CW-10-41	Water Pollution Control Facility Upgrades	$8,000,000	100%	CW	Wastewater Treatment
Leominster	CW-10-41-A	Water Pollution Control Facility Upgrades	$2,500,000	100%	CW	Wastewater Treatment
Lowell	DWP-13-03	Meter Replacement and AMR System	$673,666 [3]	100%	DW	Drinking Water Transmission and Distribution
Lowell	DWP-13-04	Redundant Transmission Main	$3,520,254 [2]	100%	DW	Drinking Water Transmission and Distribution
Ludlow	CW-08-05-A	Combined Sewer Overflow	$503,676	100%	CW	Combined Sewer Overflow Correction
Lunenburg	CW-14-29	Sewer Extension	$1,216,325 [2]	100%	CW	Collector and Interceptor Sewers

Footnotes

[1] Series 19 projects have been fully drawn and will no longer appear in Green Bond reporting. All Amounts and Loan Drawn sections are accurate as of July 31, 2019

[2] Amount was reduced following the completion of the project. Excess funds were reallocated to additional green projects and are listed within the Series 19 table.

[3] Amount reflects Series 19 Bond proceeds reallocated from excess funds of completed Series 19 projects.

Appendix A - Series 19 Projects

Borrower	Loan No.	Project Name	Amount	Loan Drawn	Program	Category
Malden	DWP-13-18	Water Distribution Systems Improvements	$1,811,870 [2]	100%	DW	Drinking Water Transmission and Distribution
Marlborough	DW-14-02	Millham Water Treatment Plant Improvements	$4,809,184	100%	DW	Drinking Water Treatment
Marlborough	CW-11-21-B	Marlborough Easterly Wastewater Treatment Plant Upgrades	$14,626,671 [2]	100%	CW	Wastewater Treatment
Medway	DW-13-13-A	Water Main Replacement	$1,216,667 [2]	100%	DW	Drinking Water Transmission and Distribution
Merrimac	DW-12-14	Water Main Replacement	$860,000	100%	DW	Drinking Water Transmission and Distribution
MFN Regional Wastewater District	CW-10-07-A	MFN Regional Wastewater District Land Treatment	$1,012,310	100%	CW	Wastewater Treatment
MWRA	CW-13-32-F	Combined Sewer Overflow Phase 14	$2,611,847	100%	CW	Combined Sewer Overflow Correction
MWRA	CW-14-37	Deer Island Treatment Plant: Digester and Cryogenics Upgrade	$6,255,873	100%	CW	Wastewater Treatment
MWRA	CW-14-38	Deer Island Treatment Plant: Electrical and Plant Upgrades	$813,700	100%	CW	Wastewater Treatment
MWRA	DW-14-14	Low Service Storage	$3,000,000	100%	DW	Drinking Water Source and Storage
MWRA	DW-14-13	Lower Hultman Aqueduct Rehabilitation	$3,000,000	100%	DW	Drinking Water Transmission and Distribution
MWRA	DW-13-21-B	Southern Spine Distribution Mains	$806,874	100%	DW	Drinking Water Transmission and Distribution
MWRA	DW-14-11	Weston Aqueduct Supply Mains and Sec 36/101	$6,876,818	100%	DW	Drinking Water Transmission and Distribution
Needham	CW-11-11-A	Replacement of Reservoir B Sewer Pump Station	$78,491	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
New Bedford	CWP-14-19	Combined Sewer Overflow Abatement	$8,063,124	100%	CW	Combined Sewer Overflow Correction
New Bedford	CWP-14-19-A	Combined Sewer Overflow Abatement	$691,540 [3]	100%	CW	Combined Sewer Overflow Correction
Norwood	CW-11-12-A	Westover Area Sewer Rehabilitation	$110,127	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Norwood	CWP-13-19	Meadowbrook Area Sewer Rehabilitation	$2,638,952	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Palmer	CWP-13-23	Sewer Replacement	$5,807,217 [2]	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Paxton	DW-14-07	Maple St. Elevated Tank	$1,370,000	100%	DW	Drinking Water Source and Storage
Quincy	DW-09-12-A	Water System Infrastructure Rehabilitation	$233,275	100%	DW	Drinking Water Transmission and Distribution
Quincy	CWP-13-26	Fort Square Pumping Station Rehabilitation	$2,787,004	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Revere	CWP-12-13	Sanitary Sewer Evaluation Survey Investigations	$767,322	100%	CW	Planning
Revere	CW-13-17	Field Investigation and Illicit Connection Detection	$1,500,000	100%	CW	Planning
Revere	CWP-13-16	Collection System Improvements	$7,218,581	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Saugus	CWP-14-08	SSO Reduction Subsystem 5	$1,579,841	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
South Essex Sewerage District	CW-13-33	Marblehead Replacement Crossing Sewer	$9,250,000	100%	CW	Collector and Interceptor Sewers
Springfield Water and Sewer Commission	DWP-13-16	South Water Transmission Main Replacement	$21,353,368 [2]	100%	DW	Drinking Water Transmission and Distribution
Taunton	CWP-11-17-A	Sewer System Separation of Combined Manholes and Upgrade of Vital Pump Stations	$180,526	100%	CW	Collector and Interceptor Sewers
Taunton	DWP-13-07	Pump Station and Water Main Replacement	$6,663,446	100%	DW	Drinking Water Transmission and Distribution

Footnotes

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Appendix A - Series 19 Projects

Borrower	Loan No.	Project Name	Amount	Loan Drawn	Program	Category
Taunton	CWP-13-18	Sanitary Sewer Evaluation Survey Phases 10-12	$6,295,244	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Taunton	CWP-14-26	Sanitary Sewer Evaluation Survey Phases 10-12	$4,021,122	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Turners Falls Fire District	DWP-13-17	Hannegan Brook Well Pump Station	$780,677 [2]	100%	DW	Drinking Water Source and Storage
Webster	DWP-13-15-A	Water Main	$170,246 [2]	100%	DW	Drinking Water Transmission and Distribution
Westborough	CW-07-19	Wastewater Treatment Plant Upgrade	$302,305	100%	CW	Wastewater Treatment
Worcester	CWP-13-20	Lake Ave Sewer Infiltration/Inflow	$1,048,196	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation

Footnotes

[1] Series 19 projects have been fully drawn and will no longer appear in Green Bond reporting. All Amounts and Loan Drawn sections are accurate as of July 31, 2019

[2] Amount was reduced following the completion of the project. Excess funds were reallocated to additional green projects and are listed within the Series 19 table.

[3] Amount reflects Series 19 Bond proceeds reallocated from excess funds of completed Series 19 projects.

Appendix B - Series 20 Projects

Borrower	Loan No.	Project Name	Amount	Loan Drawn	Program	Category
Barnstable	CW-04-31-R	Nutrient Management Planning Project	$255,941	100%	CW	Planning
Billerica	CW-14-21	Contract 35 Sewers	$9,724,962	90.7%	CW	Collector and Interceptor Sewers
Billerica	CW-14-20	Wastewater Treatment Facility Upgrades	$4,472,511 [2]	100%	CW	Wastewater Treatment
Brockton	CWP-15-22	Sewer Rehabilitation	$1,270,936 [2]	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Charles River Pollution Control District	CW-13-09-B	Wastewater Treatment Facility Improvements Phase C	$1,645,106 [2]	100%	CW	Wastewater Treatment
Chicopee	CW-14-05	Combined Sewer Overflow	$25,478,178	94.3%	CW	Combined Sewer Overflow Correction
Chicopee	CW-13-22	Integrated Municipal Stormwater and Wastewater Resource Management Plan	$996,457 [2]	100%	CW	Planning
Dracut	CW-13-24-A	Contract No. 32 Sewer Extensions	$181,873	100%	CW	Collector and Interceptor Sewers
Eastham	DWP-16-02	Water System Phase I	$10,402,720	96.4%	DW	Drinking Water Source and Storage
Eastham	DWP-15-01-A	Water System Phase I	$2,304,545	97.7%	DW	Drinking Water Transmission and Distribution
Easthampton	CW-14-13	Integrated Wastewater Resource Management Plan	$1,100,000	99.2%	CW	Planning
Everett	CW-08-14-A	Stormwater Illicit Discharge Detection	$61,076	90.8%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Everett	CW-14-24	Storm Water/Sewer Evaluation	$500,000	100%	CW	Planning
Falmouth	CWP-14-23-A	Sewer Extension and New Recharge Site	$15,694,054 [2]	100%	CW	Collector and Interceptor Sewers
Falmouth	DWP-15-02	Long Pond Water Treatment Facility	$15,320,673	100%	DW	Drinking Water Treatment
Fitchburg	CWP-13-01-A	Combined Sewer Separation Area 4D	$1,215,860 [2]	100%	CW	Combined Sewer Overflow Correction
Gardner	CWP-15-21	Wastewater Treatment Plant Upgrade	$4,433,242	98.2%	CW	Wastewater Treatment
Grafton	CW-15-14	Wastewater Treatment Plant Improvements	$14,613,300	100%	CW	Wastewater Treatment
Great Barrington	CWP-15-24	Wastewater Treatment Facility Upgrades and Sewer Improvements	$4,562,663 [2]	100%	CW	Wastewater Treatment
Haverhill	CWP-14-15	Combined Sewer Overflow Improvements, Wastewater Treatment Facility and Sewer System	$8,366,419	98.9%	CW	Combined Sewer Overflow Correction
Lawrence	CW-14-16	Sewer System Rehabilitation	$8,978,897	99.7%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Lawrence	CW-13-13	Capacity Management Operations and Maintenance Program and Sanitary Sewer Evaluation Survey	$3,840,000	100%	CW	Planning
Lowell	DWP-13-03	Meter Replacement and AMR System	$30,610 [3]	100%	DW	Drinking Water Transmission and Distribution
Lynn Water and Sewer Commission	DW-13-19	Low Service Reservior Improvements	$1,297,810	100%	DW	Drinking Water Source and Storage
Manchester by the Sea	DW-14-03	Water System Improvements	$1,440,000	100%	DW	Drinking Water Transmission and Distribution
Manchester by the Sea	CW-14-31	Comprehensive Wastewater Management Plan	$234,450	100%	CW	Planning
Mashpee	CW-00-50-C	Comprehensive Wastewater Management Plan	$78,035 [2]	100%	CW	Planning
Middleborough	CWP-14-32	Wastewater Treatment Facility Upgrades	$24,346,341	100%	CW	Wastewater Treatment
MWRA	CW-15-30	Caruso Pump Station	$2,031,614	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
MWRA	CW-15-32	Clinton Wastewater Treatment Plant Phosphorous Removal	$2,496,267	100%	CW	Wastewater Treatment

Footnotes

[1] Series 20: All Amount and Loan Drawn sections are accurate as of July 31, 2019

[2] Amount was reduced following the completion of the project. Excess funds were reallocated to additional green projects and are listed within the Series 20 table.

Appendix B - Series 20 Projects

Borrower	Loan No.	Project Name	Amount	Loan Drawn	Program	Category
MWRA	CW-15-27	Combined Sewer Overflow Phase 16	$3,038,178	100%	CW	Combined Sewer Overflow Correction
MWRA	DW-15-13	Low Service Storage	$7,474,691	100%	DW	Drinking Water Source and Storage
MWRA	DW-15-12	Lower Hultman Aqueduct Rehabilitation	$516,897	100%	DW	Drinking Water Transmission and Distribution
MWRA	DW-15-04	Wachusett Aqueduct Pump Station	$12,404,988	100%	DW	Drinking Water Transmission and Distribution
MWRA	DW-15-14	Weston Aqueduct Supply Mains and Sec 36/101	$4,419,689	100%	DW	Drinking Water Transmission and Distribution
New Bedford	DWP-14-05	Transmission Main Improvements	$4,466,812	100%	DW	Drinking Water Transmission and Distribution
Norwood	CWP-15-08	Underdrain Area Sewer Rehabilitation	$2,212,267	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Plainville	DWP-15-09	Tank Rehabilitation	$635,983 [2]	100%	DW	Drinking Water Source and Storage
Revere	CW-13-14	Capacity Management Operations and Maintenance Program Program	$300,000	100%	CW	Planning
Revere	CW-14-25	Illicit Connection Detection Program	$700,000	100%	CW	Planning
Revere	CW-15-19	Illicit Connection Detection Program	$800,000	100%	CW	Planning
Revere	CW-14-11	Comprehensive Wastewater Management Plan/CSMP Supplemental Plan	$1,200,000	100%	CW	Planning
Revere	CW-15-18	Sanitary Sewer Evaluation Survey	$1,700,000	100%	CW	Planning
Revere	DWP-13-09	Water Meters Automatic Meter Reading System	$6,370,373	100%	DW	Drinking Water Transmission and Distribution
Revere	CWP-15-29	Sewer Rehabilitation	$10,902,107	94.5%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Springfield Water and Sewer Commission	CWP-14-27	Dickinson Siphon/Main Interceptor Rehabilitation	$3,054,020 [3]	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Stockbridge	DW-15-08	Water System Improvements	$1,800,000	88.8%	DW	Drinking Water Source and Storage
Taunton	CW-14-26-A	Sanitary Sewer Evaluation Survey Phases 10-12	$4,246,535 [2]	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Taunton	CWP-13-18-A	Sanitary Sewer Evaluation Survey Phases 10-12	$95,249	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Uxbridge	DW-14-12	Rt. 122 Water Main Replacement	$3,186,000	78.4%	DW	Drinking Water Transmission and Distribution
Uxbridge	CW-16-26	Wastewater Treatment Facility - BNR and Infrastructure Upgrade	$2,628,303.00 [3]	100%	CW	Wastewater Treatment

Footnotes

[1] Series 20: All Amount and Loan Drawn sections are accurate as of July 31, 2019

[2] Amount was reduced following the completion of the project. Excess funds were reallocated to additional green projects and are listed within the Series 20 table.

Appendix C - Series 21 Projects

Borrower	Loan No.	Project Name	Amount	Loan Drawn	Program	Category
Adams Fire District	DW-16-10	Well 4 Pump Station Rehabilitation	$538,518	97.9%	DW	Drinking Water Transmission and Distribution
Brockton	CWP-16-29	Sewer Rehabilitation Project	$2,975,722	88.4%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Chatham	DW-14-06	New Water Treatment Facility	$9,274,815	90.8%	DW	Drinking Water Treatment
Fall River	CW-13-02-A	Combined Sewer Overflow Abatement Program	$487,150	95.1%	CW	Combined Sewer Overflow Correction
Fall River	CWP-16-03	Globe Street Sewer Improvements Project	$4,105,174	90.3%	CW	Combined Sewer Overflow Correction
Fall River	DWP-13-06-A	Airport Road High Service Area Improvements	$428,194	66.2%	DW	Drinking Water Source and Storage
Fall River	DWP-14-08-A	Water Main Improvements and Water Treatment Plan Residual Handling	$139,747	100%	DW	Drinking Water Transmission and Distribution
Fall River	DWP-16-09	Water Main Improvements - Phase 16	$3,512,338	89.2%	DW	Drinking Water Transmission and Distribution
Fitchburg	CWP-16-05	Beech and Hazel Streets Sewer Separation	$2,068,695	93.5%	CW	Combined Sewer Overflow Correction
Fitchburg	CWP-16-10	Fitchburg Wastewater Treatment Facility Secondary Systems Upgrade	$9,017,418	100%	CW	Wastewater Treatment
Hadley	DWP-16-03	Water Infrastructure Improvement	$172,998	100%	DW	Drinking Water Transmission and Distribution
Haverhill	DWP-16-05	Haverhill Water Treatment Plant Upgrades	$8,645,659	100%	DW	Drinking Water Treatment
Haverhill	DWP-16-07	Transmission Main Improvements	$2,549,127	98.6%	DW	Drinking Water Transmission and Distribution
Medway	CW-11-20	Integrated Water Resources Management Plan	$500,000	100%	CW	Planning
MFN Regional Wastewater District	CW-15-25-A	Water Pollution Control Facility Upgrades and Landfill Closure	$17,911,611	100%	CW	Wastewater Treatment
Montague	CWP-14-28	Pump Station Replacements	$1,583,047	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
MWRA	CW-16-42	Caruso Pump Station	$2,194,852	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
MWRA	CW-16-43	Wastewater Treatment Plant and Sewer Improvements	$3,394,837	100%	CW	Wastewater Treatment
MWRA	CW-17-34	Wastewater Treatment Plant and Sewer Improvements	$3,249,355	100%	CW	Wastewater Treatment
MWRA	CW-17-35	Remote Headworks Upgrade	$4,786,700	100%	CW	Infiltration/Inflow and Sewer System Rehabilitation
MWRA	CW-17-36	Clinton Wastewater Treatment Plant Phosphorous Removal	$3,759,927	100%	CW	Wastewater Treatment
MWRA	DW-16-06	Southern Extra High Redundancy and Storage	$4,045,484	100%	DW	Drinking Water Source and Storage
MWRA	DW-16-23	Low Service Storage	$319,493	100%	DW	Drinking Water Source and Storage
MWRA	DW-17-15	Wachusett Aqueduct Pumping Station	$28,249,352	100%	DW	Drinking Water Transmission and Distribution
Nantucket	CW-15-26	Surfside Wastewater Treatment Facility Improvements	$8,472,975	86.6%	CW	Wastewater Treatment
Nantucket	CW-16-36	Shimmo & PLUS Parcels Sewer Extension	$14,101,765	81%	CW	Collector and Interceptor Sewers
New Bedford	CW-16-37	Supplemental Wastewater and Stormwater Plan	$1,000,000	98%	CW	Planning
Northampton	CWP-10-14-R	Pumping Station Improvements	$86,222	84.7%	CW	Planning and Design Only
Norwood	CWP-15-08-A	Underdrain Area Sewer Rehab	$414,356	87.6%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Quincy	CWP-15-06	Pumping Station Renovation	$3,634,026	97.2%	CW	Infiltration/Inflow and Sewer System Rehabilitation

Footnotes

[1] Series 21: All Amounts and Loan Drawn sections are accurate as of July 31, 2019

Appendix C - Series 21 Projects

Borrower	Loan No.	Project Name	Amount	Loan Drawn	Program	Category
Revere	CW-16-19	Phase VIII Field Investigations - I/I and Illicit Discharge Detection and Elimination	$1,500,000	92%	CW	Planning
Revere	CW-16-23	Illicit Connections & Sump Pump Detection	$850,000	95%	CW	Planning
Revere	DW-13-10	GIS Implementation of Automatic Meter Reading Program	$250,000	75.3%	DW	Drinking Water Planning and Design
Saugus	CWP-16-09	Sewer System and Pump Station Rehab/Improvements	$3,197,219	96.5%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Shrewsbury	DW-16-15	Home Farm Water Treatment Facility Upgrade	$12,074,031	96%	DW	Drinking Water Treatment
Taunton	CWP-16-38	Sewer/Drain Separation and Inflow Removal	$3,927,054	97.9%	CW	Infiltration/Inflow and Sewer System Rehabilitation
Upper Blackstone Water Pollution Abatement District	CWP-16-39	Nutrient Removal Improvements	$8,842,079	100%	CW	Wastewater Treatment
Uxbridge	CW-16-26-A	Wastewater Treatment Facility BNR and Infrastructure Upgrade	$17,253,299	100%	CW	Wastewater Treatment

Footnotes

[1] Series 21: All Amounts and Loan Drawn sections are accurate as of July 31, 2019