New York City Water Board

Report on the Cost of Supplying Water to Upstate Customers for the 2022 Rate Year

June 7, 2021

Amawalk
Consulting Group LLC

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To the Members of the New York City Water Board:

The Amawalk Consulting Group LLC is pleased to submit its Report on the cost of supplying water to upstate customers of the Water System of the City of New York (the "City"). The Report presents our findings on the cost of service and identifies: a) the unit rate for Fiscal Year 2021 that is necessary to recover the anticipated cost of water supply service, and b) the proposed unit rate for Fiscal Year 2022 for consideration by the Water Board.

The Report presents the actual cost of water supply service for Fiscal Years 2018 through 2020. The methodology used to develop the cost of service for these years is consistent with that used in previous years. In addition, the anticipated cost of service is presented for Fiscal Years 2021 through 2025 (the "Projection Period").

The Report shows that the cost of water supply service in 2021 and 2022 is expected to be relatively comparable to the actual costs incurred in 2018 through 2020. The cost of service is then expected to increase in 2023 through 2025. The increases are primarily attributable to rising operating expenses, including the property taxes levied on watershed properties, together with capital investments in water supply infrastructure. Significant investments have been made in the Water System in recent years to protect the quality of the water supply, to enhance the integrity of the System, and to achieve other water supply objectives. Additional capital investments will be made during the Projection Period. In addition to the projected changes in the cost of service, the unit rate for water supply service is impacted by changes in both upstate and in-City consumption: the expectation is that long-term System-wide water consumption will decline at a relatively slow pace.

We appreciate the opportunity to be of assistance to the Water Board and would be pleased to answer any questions you may have regarding the study methodology or findings. We also wish to acknowledge the assistance provided by representatives of the Office of Management and Budget, the Department of Environmental Protection, the Law Department, the Water Board and the New York City Municipal Water Finance Authority in the preparation of this Report.

Should you have any questions or comments, please do not hesitate to contact the undersigned at (212) 361-0050.

Very truly yours,

Edward J. Markus
Amawalk Consulting Group LLC

Table of Contents

1.0 INTRODUCTION 1

1.1 PURPOSE 1
1.2 SCOPE 1
1.3 BACKGROUND 2
1.3.1 The Water System 2
1.3.1.1 The Croton System 3
1.3.1.2 The Catskill System 4
1.3.1.3 The Delaware System 4
1.3.1.4 The Catskill Aqueduct 4
1.3.1.5 The Delaware Aqueduct 5
1.3.1.6 The Queens Groundwater Supply 5
1.3.1.7 Long-Term System Capacity 5
1.3.1.8 System Security 5
1.3.2 Condition of the Water System 5
1.3.2.1 Rondout-West Branch Tunnel 6
1.3.2.2 The Gilboa Dam and Ashokan Reservoir 6
1.3.2.3 Kensico-Eastview Connection 7
1.3.3 Water Quality and Treatment 7
1.3.3.1 Filtration in the Croton System 7
1.3.3.2 Watershed Protection/Filtration Avoidance in the Catskill and Delaware Systems 7
1.3.3.3 Disinfection Requirements 8
1.3.3.4 Water Quality Preservation for Upstate Watersheds 9
1.3.4 Water Quality Monitoring 9
1.3.5 Governmental Regulation 9
1.3.6 Drought Management 10
1.3.7 Pending Litigation 11
1.3.8 Sandy and Climate Change 12
1.3.9 Site of the Former Mt. Kisco Wastewater Treatment Plant 13
1.3.10 Novel Coronavirus 14
1.4 WATER DEMAND MANAGEMENT 14
1.5 THE ROLES OF THE AUTHORITY, THE BOARD, AND THE CITY IN THE WATER SYSTEM 15
1.6 ADDITIONAL INFORMATION ON THE WATER SYSTEM, THE BOARD, AND THE AUTHORITY 16

2.0 THE SALE OF WATER TO CUSTOMERS NORTH OF THE CITY 17

2.1 BACKGROUND 17
2.2 RATES AND CHARGES FOR UPSTATE CUSTOMERS 17

3.0 COST OF SERVICE METHODOLOGY 21

3.1 OVERVIEW 21
3.2 PROCEDURES FOR CALCULATING THE COST OF SERVICE 21
3.2.1 Step A 21
3.2.2 Step B 22
3.2.3 Step C 22
3.2.4 Step D 22
3.2.5 Step E 23
3.2.6 Step F 23
3.2.7 Graphical Overview 23
3.3 COMPUTATION OF THE REGULATED RATE 25
3.4 SOURCES OF DATA AND BASIS OF PRESENTATION 25

4.0 COMPUTATION OF THE COST OF SERVICE AND THE REGULATED RATE 26

4.1 INTRODUCTION 26

4.2 BUREAU OF WATER SUPPLY COSTS RELATED TO FACILITIES LOCATED NORTH OF THE CITY - STEP A 26
4.2.1 Other Than Personal Services Costs 26
4.2.1.1 Real Estate Taxes 29
4.2.1.2 Chemicals 31
4.2.1.3 Operating Expenses Associated with Hillview Reservoir 33
4.2.1.4 Contractual Services 33
4.2.1.5 UV Facility 33
4.2.1.6 Filtration Avoidance 34
4.2.1.7 Other OTPS Expenses 34
4.2.2 Debt Service/Capital Improvement Financing 35
4.2.2.1 Historical Investments in the Water System 35
4.2.2.2 Debt Service Related to the Water System 36
4.2.2.3 Cash-Financed Construction and Cash Used for the Defeasance of Bonds 38
4.2.2.4 Ongoing and Future Capital Improvements 41
4.2.2.5 Capital Cost Summary 41
4.2.3 Judgments and Claims 42
4.2.4 Miscellaneous Revenue 42
4.2.5 Personal Service Costs 43
4.3 CALCULATION OF ALLOCATION PERCENTAGES - STEP B 45
4.4 ALLOCATION OF DEPARTMENT OF ENVIRONMENTAL PROTECTION COSTS - STEP C 45
4.5 ALLOCATION OF CITY CENTRAL SERVICE COSTS - STEP D 45
4.6 COST OF SERVICE - STEP E 46
4.7 CALCULATION OF THE REGULATED RATE - STEP F 48
4.8 ADDITIONAL ISSUES RELATING TO THE COST OF SERVICE AND THE REGULATED RATE 53
4.8.1 Operating Risks 53
4.8.2 Water Demand Management Initiatives 53
4.8.3 Upstate Wastewater Treatment Plants 54
4.8.4 COVID-19 54
5.0 IMPACTS ON CUSTOMERS OF THE CALCULATED AND PROPOSED REGULATED RATE ... 55

List of Figures and Tables

Figure 1	Map of the Water System	3
Figure 2	Diagram of Calculation	24
Figure 3	Projected 2022 Other Than Personal Services Costs	29
Figure 4	Real Estate Taxes for the Water System	31
Figure 5	Projected 2022 Cost of Service Components	48
Figure 6	Comparison of Water System Consumption	52
Figure 7	Impact of Cost of Service and Consumption on Unit Rate	56
Table 1A	Historical Cost of Service	58
Table 1B	Cost of Service Projections	59
Table 2A	Current Water Rates for Upstate New York Communities	60
Table 2B	Current Water Rates for Upstate New York Communities	61
Table 3	Summary of Impacts on Upstate Customers	62
Table 4A	Historical Upstate Other Than Personal Services Costs	63
Table 4B	Projected Upstate Other Than Personal Services Costs	64
Table 5A	Authority Bond Proceeds	65
Table 5B	NYSEFC Bond Proceeds	65
Table 5C	Debt Service	67
Table 5D	Cash Used for Construction and the Defeasance of Debt	68
Table 6	Judgments and Claims	69
Table 7	Miscellaneous Revenue	70
Table 8A	Historical Upstate Direct Personal Services Costs	71
Table 8B	Projected Upstate Direct Personal Services Costs	72
Table 9A	Historical Upstate Indirect Personal Services Costs	73
Table 9B	Projected Upstate Indirect Personal Services Costs	74
Table 10	Development of Allocation Factors	75
Table 11A	Historical Allocation of DEP Personal Services Costs	76
Table 11B	Projected Allocation of DEP Personal Services Costs	77
Table 12A	Historical Allocation of DEP Other Than Personal Services Costs	78
Table 12B	Projected Allocation of DEP Other Than Personal Services Costs	79
Table 13	Annual Water Consumption	80
Table 14	Projected Revenues From Hydroelectric Facilities	81
Table 15	Comparison of Upstate Customer Billings vs. Cost of Service	82

1.0 Introduction

1.1 Purpose

The purpose of this Report is to summarize the results of the study performed by the Amawalk Consulting Group LLC ("Amawalk") of the cost of providing water supply service to communities north of New York City (hereinafter, "the City"). The Report presents the calculated regulated rate for Fiscal Year 2022 to recover the cost of service. The Report also presents the calculated cost of service and rates for Fiscal Years 2018 through 2020; the anticipated cost of service and rate for 2021 (the current year); and the projected cost of service and rates for 2023 through 2025. The proposed regulated rate for Fiscal Year 2022 is $2,054.63 per million gallons ("MG"), which represents an increase of $166.57 per MG from the current unit rate of $1,888.06, or an increase of 8.82%. It is noted that differences in the rate being charged and the cost of service will be recovered through the reconciliation process as described herein.

No rate action was taken by the New York City Water Board (the "Board") for water supply service in Fiscal Year 2021. Thus, the current regulated unit rate that is being used to bill customers for water supply service was implemented beginning with the 2020 Fiscal Year, or July 1, 2019.

1.2 Scope

The Report presents the findings of Amawalk regarding the revenue requirements for water supply service as well as water consumption by customers and a unit rate for calculating charges to upstate customers. The revenue requirements take into consideration the operation and maintenance expenses, principal and interest on bonds, and other financial needs related to facilities north of the City. The Fiscal Year 2022 cost of service and unit rate are based, in part, on the calculated cost of service and revenues recovered for the current fiscal year and prior years, which is presented herein. All years referred to in the Report reflect the fiscal year of the City that begins July 1 and ends June 30.

Amawalk has reviewed, to the extent practicable, the books, records, financial reports, and statistical data of the City, the Board, and the New York City Municipal Water Finance Authority (the "Authority"), and it has conducted such other investigations and analyses as deemed necessary to assemble and analyze the cost of water supply service and rates. We have performed analyses necessary to support our findings and conclusions.

In analyzing the projection of future operations summarized in this Report, Amawalk has reviewed certain assumptions with respect to conditions, events, and circumstances, which may occur in the future. We believe that these assumptions are reasonable and attainable, although actual results may differ from those in the forecast as influenced by the conditions, events, and circumstances, which actually occur.

1.3 Background

The City, through its Department of Environmental Protection ("DEP"), is responsible for operating and maintaining dependable sources of water supply and providing drinking water to certain communities north of the City and to in-City consumers. DEP operates and maintains the water supply system (the "Water System" or the "System") and is responsible for planning, designing and constructing capital improvements to the System. The Capital Improvement Program (the "CIP") of DEP identifies planned commitments for design, construction, and construction-related work for the System by category of project in each year of the planning period of 2022 through 2029.

The information presented in this Report is as of April 30, 2021, unless otherwise noted. Additional information, changes in the System, or events occurring after this date are not reflected in the Report. This Section 1.3 is intended to provide background information for the reader.

1.3.1 The Water System

Water for the System can be drawn from three upstate reservoir systems (Croton, Catskill, and Delaware) and a system of wells in Queens. The three upstate water collection systems, which benefit customers north of the City, as well as in-City consumers, include 19 storage reservoirs and three controlled lakes with a total storage capacity of approximately 570 billion gallons. They were designed and built with various interconnections to increase flexibility by permitting the exchange of water from one system to another. This feature mitigates localized droughts and takes advantage of excess water in any of the three watersheds. DEP is continuing to enhance its infrastructure to increase its operational flexibility.

The Water System furnishes water to users in portions of four of the eligible counties north of the City. The Water System provides water to nearly 90% of the residents in Westchester County and approximately 10% of the residents in Putnam, Orange, and Ulster Counties.

Although all water from the Croton System must be pumped, approximately 95% of the total water supply delivered from the Catskill and Delaware Systems is delivered by gravity. Figure 1 provides an overview of the Water System.

Figure 1 Map of the Water System

1.3.1.1 The Croton System

The Croton System consists of 12 reservoirs and three controlled lakes on the Croton River, its three branches, and three other tributaries. The water in the Croton System flows from upstream reservoirs through natural streams to downstream reservoirs, terminating at the New Croton Reservoir. The watershed that supplies the Croton System has an area of 375 square miles. It lies primarily within the State of New York (the "State"), approximately 45 miles north of lower Manhattan, with a small portion in the State of Connecticut.

The Croton System is available to supplement the Catskill System and the Delaware System. Use of the Croton System is determined by DEP's operational needs.

1.3.1.2 The Catskill System

The Catskill and Delaware Systems together currently provide the vast majority of the daily water supply for the City and customers north of the City. The Catskill System watersheds occupy sparsely populated areas in the central and eastern portions of the Catskill Mountains. Water in the Catskill System comes from the Esopus and Schoharie Creek watersheds, located approximately 100 miles north of lower Manhattan and 35 miles west of the Hudson River. The Catskill System is comprised of Schoharie Reservoir (formed by the Gilboa Dam across Schoharie Creek) and Ashokan Reservoir (formed by the Olivebridge Dam across Esopus Creek) and the Catskill Aqueduct. Schoharie Reservoir water is delivered to the Esopus Creek via the Shandaken Tunnel, from which it then travels to Ashokan Reservoir.

1.3.1.3 The Delaware System

The Delaware System is located approximately 125 miles north of lower Manhattan. Three Delaware System reservoirs collect water from a sparsely populated region on the branches of the Delaware River: Cannonsville Reservoir (formed by the Cannonsville Dam on the West Branch of the Delaware River), Pepacton Reservoir (formed by the Downsville Dam across the East Branch of the Delaware River), and Neversink Reservoir (formed by the Neversink Dam across the Neversink River, a tributary to the Delaware River). Water from these three reservoirs is diverted to Rondout Reservoir, formed by the Merriman Dam across Rondout Creek, a tributary to the Hudson River.

The conditions under which the System's Pepacton, Neversink, and Cannonsville Reservoirs may be operated are set forth under the terms of a 1954 decree of the Supreme Court of the United States (the "1954 Decree"). It authorizes the System to divert up to 800 million gallons per day ("MGD") of water from the Delaware River Basin for use by the Water System, subject to specified conditions. A series of agreements among the parties to the 1954 Decree required the System, under certain circumstances, based on the time of year, reservoir storage, anticipated inflow and water supply demand, to release water from the three reservoirs into the tributaries of the Delaware River, in support of enhanced habitat protection and flood mitigation. A new agreement among the Decree Parties was reached in October 2017, which establishes a new 10-year program. The agreement protects the available supply of drinking water for the City, and expands efforts to enhance flood attenuation and support recreational use of the upper Delaware River. The parties to the agreement have committed to pursue a number of scientific studies to refine management of the resources to advance the myriad interests connected to the Delaware River. Enforcement of the 1954 Decree is under the jurisdiction of a River Master appointed by the Supreme Court of the United States.

1.3.1.4 The Catskill Aqueduct

The Catskill Aqueduct, which conveys water by gravity, is 92 miles long and extends from Ashokan Reservoir to Kensico and Hillview Reservoirs. The delivery capacity of the Catskill Aqueduct from Ashokan Reservoir to Kensico Reservoir is about 600 MGD. From Kensico Reservoir to Hillview Reservoir, the Catskill Aqueduct has a capacity of approximately 800

MGD. The Catskill Aqueduct passes under New Croton Reservoir. At this location, it is possible to transfer water from Ashokan Reservoir to New Croton Reservoir.

1.3.1.5 The Delaware Aqueduct

The Delaware Aqueduct is 85 miles long and similarly carries water by gravity from Rondout Reservoir to West Branch Reservoir, which is in the Croton System, and from West Branch Reservoir to Kensico Reservoir, and then on to Hillview Reservoir. Water enters the Delaware Aqueduct via the Rondout Reservoir, which is fed by the Neversink, Pepacton, and Cannonsville Reservoirs. The capacity of the section that delivers water from Rondout Reservoir to West Branch Reservoir is about 890 MGD. The delivery capacity of the Delaware Aqueduct from West Branch Reservoir to Kensico Reservoir is about 1,050 MGD. The Delaware Aqueduct has a capacity of approximately 2,020 MGD from Kensico Reservoir to Hillview Reservoir.

1.3.1.6 The Queens Groundwater Supply

The System also includes a number of groundwater wells in the Borough of Queens. These wells have been offline since 2007 due to the availability of higher quality water from the Catskill and Delaware Systems. When in use, the wells are capable of providing approximately 1% of the City's daily water supply. The wells could be used to provide more of the daily supply if required to meet water supply needs. Unlike the rest of the City's water supply, which is a surface and gravity-supplied system originating in a network of upstate reservoirs, well water is pumped from extensive underground aquifers.

1.3.1.7 Long-Term System Capacity

Current demand and flow projections show that if conservation programs, including metering, toilet replacement, hydrant locking, leak detection, and public information campaigns remain effective, there will be no immediate need for the City to find additional long-term water supply sources to meet normal demand. However, with the construction of the Rondout-West Branch bypass tunnel noted in Section 1.3.2.1, there will be a short-term need for water supply augmentation and/or demand management.

1.3.1.8 System Security

DEP protects the watershed, including water supply structures and facilities, through a DEP police force of approximately 200 officers and secures facilities through locks, fences, and other physical barriers to prevent access by unauthorized persons.

1.3.2 Condition of the Water System

The System has reliably served the City since 1842, and many additions and improvements have been made over the years to develop the System that exists today. On an overall basis, AECOM USA, Inc., the consulting engineer to the Authority, rates the condition of the water and wastewater system of the City "Adequate", the highest rating category[1]. Nonetheless, DEP is

[1] See Fiscal Year 2021 Consulting Engineer's Report, March 2021, prepared by AECOM

pursuing a number of initiatives to enhance the long-term integrity of the Water System. An overview of some of these initiatives is presented in this part of the Report.

1.3.2.1 Rondout-West Branch Tunnel

The Rondout-West Branch Tunnel is a section of the Delaware Aqueduct which can convey up to 890 MGD, and typically delivers an annual average of 600 MGD, more than 50% of the City's daily water supply. The Tunnel carries water 45 miles from the Delaware System under the Hudson River and into West Branch Reservoir. It has the highest pressures and the highest velocities in the Water System. A portion of the tunnel crosses a fractured rock formation, which is potentially subject to greater stress than the deep rock tunnels located in the City.

DEP regularly assesses the condition and integrity of the System's tunnels and aqueducts to determine the extent and effect of water loss and, since the early 1990s, DEP has monitored the condition of the Rondout-West Branch Tunnel. As a result of DEP's flow tests, visual observations and other analyses, it has been determined that approximately 15 MGD to 36 MGD of water is being lost from the Rondout-West Branch Tunnel and is surfacing in the form of springs or seeps in the area. This amounts to a loss of approximately 4% of the daily volume of water provided by the tunnel under peak flow conditions. The situation in the Rondout-West Branch Tunnel and the amount of water loss is stable. In the opinion of the professional engineering firm retained by DEP in conjunction with that investigation, there is very little immediate risk of failure of the Rondout-West Branch Tunnel.

To address the leak, DEP is undertaking its Water for the Future program, which includes construction of an approximately two and one-half mile long bypass tunnel. Connection of the bypass to the existing tunnel is expected to require that the tunnel be shut down for up to eight months or two or three shut downs of shorter duration, starting in 2022, during which periods supply augmentation and demand management practices are expected to be needed. The estimated remaining cost to complete the design and construction of the shafts and tunnel bypass and to implement updated water supply augmentation projects and water conservation measures is $137 million, $134 million of which is funded in the CIP.

1.3.2.2 The Gilboa Dam and Ashokan Reservoir

Gilboa Dam, part of the Catskill Water System, is comprised of an earthen dam and a concrete gravity dam, with the concrete portion also acting as the spillway. DEP is currently upgrading the dam to meet safety guidelines for new dams. The estimated cost to complete the rehabilitation of the dam is $37 million, $23 million of which is funded in the CIP.

DEP will be making improvements to the structures and mechanical systems at the Ashokan Reservoir, including upgrading and stabilizing the thirteen dikes and dams that impound the Reservoir to bring them up to modern standards. The estimated cost of the improvements at the Ashokan Reservoir to be performed in the years covered by the CIP is $1.11 billion, $974 million of which is included in the CIP.

1.3.2.3 Kensico-Eastview Connection

The Kensico-Eastview Connection ("KEC") will connect the Kensico Reservoir to the Ultra Violet ("UV") Disinfection Facility, providing critical redundancy in the Water System. The project is estimated to cost $1.8 billion, $1.6 billion of which is included in the CIP.

1.3.3 Water Quality and Treatment

Pursuant to the Safe Drinking Water Act (the "SDWA"), the United States Environmental Protection Agency ("USEPA") has promulgated nationwide drinking water regulations which specify the maximum level of contaminants allowed in drinking water and which govern the construction, operation, and maintenance of the System. USEPA has also promulgated filtration treatment regulations, known as the federal Surface Water Treatment Rule ("SWTR"), which prescribe guidelines concerning protection and treatment of surface water supplies. Enforcement of many of the related regulations promulgated under the SDWA, including the SWTR, has been delegated by USEPA to the New York State Department of Health ("NYSDOH").

1.3.3.1 Filtration in the Croton System

The City has constructed a full scale water treatment facility to filter Croton System water. While the facility is operational, it is anticipated that the total remaining cost to complete the Croton filtration plant will be $41.8 million, all of which is included in the CIP. Since the Croton Filtration Plant is located within the City and does not supply water to upstate customers, all capital costs of the Croton Filtration Plant after late 2004 are excluded from the cost of water supply service for the regulated rate.

1.3.3.2 Watershed Protection/Filtration Avoidance in the Catskill and Delaware Systems

With respect to the Catskill and Delaware Systems, the City believes that it will continue to be able to meet the criteria for non-filtered supplies under the SWTR.

Since 1993, DEP has operated the Catskill and Delaware Systems pursuant to a series of Filtration Avoidance Determinations ("FADs") under which the City is not required to filter water from such systems. Each FAD has required the City to take certain actions to protect the Catskill and Delaware Water supplies. Based on an analysis performed in 2007, DEP estimated that if the City were to have to filter water from the Catskill and Delaware Systems, construction costs would be $6 billion. An updated analysis is to be performed as part of the 2017 FAD, as defined below. DEP expects that any updated estimate will exceed $6 billion. To further the City's ability to comply with the FAD, on January 21, 1997, the City entered into the Watershed Memorandum of Agreement (the "MOA") with the State, watershed communities, USEPA, and several environmental groups.

In December 2017, NYSDOH issued a new FAD (the "2017 FAD"), which supersedes previous FADs. The 2017 FAD will remain in effect until a further determination is made, anticipated in 2027. The estimated remaining capital cost of complying with the 2017 FAD is $227 million, of which $195 million is funded in the CIP.

The 2017 FAD continues many of the protective actions within the watershed included in previous FADs, including land acquisition; working with farmers to prevent farm runoff from reaching streams; upgrading wastewater infrastructure; and stabilizing streambanks to withstand flood events and reduce erosion. In addition, the 2017 FAD includes enhancements to existing programs, including a new focus on acquiring lands in stream buffers and flood prone areas; resizing municipal infrastructure like bridges and culverts to better accommodate high stream flows; and expanding eligibility to small businesses to access funds to repair failing septic systems.

On August 10, 2020, an expert panel convened by the National Academies of Science, Engineering, and Medicine and funded by DEP pursuant to the 2017 FAD released a report assessing DEP's long-term watershed protection program. While the report includes recommendations that are under consideration by DEP, its regulatory agencies, and other stakeholders in connection with the midterm revisions to the 2017 FAD, the report concludes that DEP's watershed protection program supports continued filtration avoidance.

As of 2021, high volume hydraulic fracturing ("HVHF") is banned by law in New York State. While HVHF is prohibited, low volume hydraulic fracturing is currently allowed Statewide, including in the watershed. However, NYSDEC has stated its belief that low volume hydraulic fracturing is not economically viable, and especially in light of the Statewide ban, it is unlikely that it will take place in the watershed in the foreseeable future.

1.3.3.3 Disinfection Requirements

The purpose of USEPA's Long Term 2 Surface Water Treatment Rule ("LT2") is to reduce the incidence of waterborne disease by mandating certain levels of inactivation and/or the removal of certain microorganisms from the Water System, including the Catskill and Delaware Systems. DEP is complying with such levels through the operation of its UV Facility, which provides treatment for Catskill and Delaware water.

LT2 also mandates that uncovered finished water storage facilities, which include Hillview Reservoir, be covered or that water from such facilities be treated.

DEP's commitments to cover the Hillview Reservoir are memorialized in a federal Consent Decree (the "Hillview Consent Decree") that was entered into in May 2019. The schedule for construction of the cover in the Hillview Consent Decree will enable DEP to complete two higher priority water supply infrastructure capital improvements: construction of the KEC and the Hillview Reservoir Improvements ("HVR"). The Hillview Consent Decree includes design and construction milestones for the KEC, the HVR and the cover and stipulated penalties to enforce such milestones; the milestone for completion of the cover is in 2049.

The most recent estimate of the cost of constructing a concrete cover over Hillview Reservoir, as DEP originally proposed, is expected to be approximately $1.6 billion. DEP has initiated facility

planning to analyze alternative methods to covering the reservoir and achieving LT2 and the Hillview Consent Decree. The CIP includes $50 million for a cover. On June 23, 2020, DEP provided notice to USEPA and NYSDEC that the City was unlikely to satisfy the Hillview Consent Decree's milestone related to the HVR preliminary design on account of delays related to the outbreak of COVID-19. DEP has requested a modification to the Hillview Consent Decree relating to the HVR preliminary design milestone. All other terms and milestones of the Hillview Consent Decree would remain unchanged.

1.3.3.4 Water Quality Preservation for Upstate Watersheds

The City provides for improvements to the upstate watersheds including projects undertaken pursuant to the FADs for the Catskill and Delaware watersheds such as the acquisition of environmentally sensitive property, the creation of community wastewater management systems in areas where because of historic development patterns, individual septic systems do not provide adequate treatment, and retrofits to capture and treat stormwater from developed areas.

1.3.4 Water Quality Monitoring

The System has multiple laboratories employing microbiologists, chemists, hydrologists, limnologists, and other scientists to monitor water quality. In addition to the monitoring program, DEP inspectors maintain surveillance of the watersheds.

The SDWA requires all drinking water suppliers to provide the public with an annual statement describing the sources and quality of its water supply. The most recent Drinking Water Supply and Quality Report prepared by DEP for calendar year 2020 demonstrates that the quality of the City's drinking water remains high. This report was prepared in accordance with the New York State Sanitary Code and the National Primary Drinking Water Regulations and can be found at: https://www1.nyc.gov/site/dep/about/drinking-water-supply-quality-report.page

1.3.5 Governmental Regulation

The System is subject to federal, State, interstate, and municipal regulation. At the federal level regulatory jurisdiction is vested in USEPA; at the State level in NYSDEC and NYSDOH; at the interstate level in the Delaware River Basin Commission ("DRBC") and the Interstate Environmental Commission; and at the municipal level in DEP, the New York City Department of Health and Mental Hygiene ("NYCDOH"), the New York City Department of Buildings ("DOB"), the New York City Department of Small Business Services, and, to a limited degree, in municipalities and districts located in eight counties directly north of the City. Water quality protection regulations are enforced within the watershed areas north of the City through a network of overlapping governmental jurisdictions including NYSDEC, NYSDOH, DEP, and local municipal police, engineers, and inspectors. The various jurisdictions maintain physical security, take water samples, monitor construction activities and wastewater treatment in the watershed, and generally oversee the physical condition of, activity on, and operation of water supply lands and facilities. Portions of the overall legislative and regulatory framework governing the watersheds may be found in the City's Administrative Code, Health Code, and

Watershed Regulations. Regulatory enforcement within City limits is almost exclusively accomplished through City personnel. Provisions incorporating and augmenting the substance of the SDWA, related regulations, and the State Sanitary Code, are contained in the Health Code and the City's Building and Building Construction Codes. These provisions are enforced by personnel from DEP, NYCDOH, and DOB.

Wastewater Resource Recovery Facilities
The Water System includes six City-owned surface discharging Wastewater Resource Recovery Facilities ("WRRFs") in the watershed, one City-owned subsurface discharging WRRF in the watershed, and one additional City-owned upstate surface discharging water pollution control plant in the City of Port Jervis.

Shandaken Tunnel SPDES Permit
As a result of the federal court's determination in 2003 that a State Pollution Discharge Elimination System ("SPDES") permit is required for the City's transfer of water through the Shandaken Tunnel, DEP applied for and obtained a SPDES permit for the Shandaken Tunnel in 2006. As a result of State Court litigation challenging the terms of the SPDES permit, in 2008, DEP applied for variances with respect to the permit's temperature and turbidity limits. The State has not acted on DEP's variance application. Under USEPA's Water Transfers Rule, adopted in 2008 as the State Court litigation was concluding, the Clean Water Act permit program does not apply to transfers of untreated water (such as the Shandaken Tunnel), and the City does not believe it is required to maintain a SPDES permit for this water transfer under federal law.

1.3.6 Drought Management

From time to time the Water System experiences drought conditions caused by significantly below-normal precipitation in the watershed areas. The last drought was in 2002. As of April 26, 2021, the System's reservoirs were filled to 98.9% of capacity. Normal levels as of that date are approximately 100.0% of capacity.

Throughout even the most extreme droughts, the Water System has continued to supply sufficient quantities of water to the City and its water supply customers north of the City. To ensure adequate water supply during drought conditions, DEP, in conjunction with other City, State, and interstate agencies, maintains a Drought Management Plan. The Drought Management Plan defines various drought phases that trigger specific management and operational action. Three defined phases are: "Drought Watch", "Drought Warning", and "Drought Emergency". A Drought Emergency is further subdivided in four stages based on the projected severity of the drought and provides increasingly stringent and restrictive measures.

A Drought Watch is declared when there is less than a 50% probability, based on the existing record since 1927, that either the Catskill or Delaware Reservoir System will be filled by the following June 1. This phase maximizes the pumping of water from the Croton System. In addition, during this phase, a public awareness program begins, and users, including upstate

communities taking water from the System, are requested to initiate conservation measures. NYSDOH, NYSDEC, and the DRBC are advised of the Water System's status, and discussions are held with City agencies concerning their prospective participation in the event of a declaration of a Drought Warning.

A Drought Warning is declared when there is less than a 33% probability that either the Catskill or the Delaware Reservoir System will fill by June 1. All previous efforts are continued or expanded and additional programs are initiated, including the coordination of specific water saving measures by other City agencies.

A Drought Emergency is declared when it becomes necessary to reduce consumption by imposing even more stringent measures. In addition to the imposition of restrictions, DEP may enhance existing System management and public awareness programs, expand its inspection force, and perform additional leak and waste surveys in public and private buildings. DEP may also require communities outside of the City that are served by the System to adopt similar conservation measures.

1.3.7 Pending Litigation

The following paragraphs describe certain legal proceedings and claims against the Water System. No assurances are provided that the following information is complete or identifies all of the potential litigation against the System. The ultimate outcome of these proceedings and other claims is unpredictable and could result in substantial judgments that would have to be borne by all customers of the System.

DEP adds alum to the Catskill Aqueduct upstream of Kensico Reservoir when necessary to control turbidity levels. The diversions of water containing alum into Kensico Reservoir are authorized under a SPDES permit for the Catskill Influent Chamber ("Catalum SPDES Permit"). Among other things, the Catalum SPDES permit requires DEP to take measures to reduce the use of alum. One such measure is DEP's use of the Ashokan Release Channel to release water from the Ashokan Reservoir through a release channel into the lower Esopus Creek. This release of water from the west basin of Ashokan Reservoir helps prevent the transfer of turbid water to the east basin but can result in an increase in both flow and turbidity in the lower Esopus Creek, which some stakeholders have opposed. NYSDEC served the City with an administrative complaint in February 2011, alleging a number of violations of the Catalum SPDES Permit. DEP and NYSDEC executed an administrative consent order in October 2013, which requires, among other things, that DEP seek a modification of the Catalum SPDES Permit to incorporate a protocol for operating the Ashokan Release Channel.

On June 30, 2015, upstate communities sought review from NYSDEC of Entitlement Rates for Fiscal Years 2015 and 2016. On August 18, 2016, they filed another petition with NYSDEC seeking review of the Entitlement Rate for Fiscal Year 2017 and seeking to determine whether the New York Public Service Commission or NYSDEC has jurisdiction to review the Excess

Rate. On February 9, 2018, the NYSDEC administrative law judge ("ALJ") ruled that NYSDEC has jurisdiction to review the Excess Rate. The parties did not appeal the NYSDEC ruling and accordingly will participate in NYSDEC's review of both the Entitlement Rate and Excess Rate for Fiscal Years 2015-2017. During a preliminary issues conference with the NYSDEC ALJ held on March 5, 2019, the parties identified certain legal issues to be resolved prior to proceeding with the rate review, including whether a newly joined upstate petitioner may raise additional issues to be litigated at the hearing, and the applicable standard of review for excess water rates. The issues were briefed, and a decision was issued by the NYSDEC ALJ on October 7, 2019. The upstate communities appealed the NYSDEC ALJ's decision to the NYSDEC Commissioner on December 13, 2019, and the appeal is now fully briefed and awaiting a decision by the Commissioner.

1.3.8 Sandy and Climate Change

The City has more than 500 miles of coastline, bordering the Atlantic Ocean as well as rivers, bays, and inlets. Two of its five Boroughs, Manhattan and Staten Island, are islands and water forms the principal boundary of the remaining three. As a result, the City is directly affected by rising sea levels and exposed to intensifying coastal storms.

On Monday, October 29, 2012, Hurricane Sandy hit the Mid-Atlantic East Coast as a tropical storm ("Sandy"). The City continues to expend funds to address the impact of Sandy on the System, but anticipates that the costs to the System relating to the storm will continue to largely be paid from non-City sources, primarily the federal government. There is no assurance that if the City were to experience a similar storm in the future that the federal government would pay the costs.

DEP has been engaged in an ongoing review of the effects of climate change on the System, including the impact of rising sea levels and changes to the intensity and frequency of precipitation events throughout the System, including the impact on the System's water supply assets. In June 2013, the City released a report, updated in April 2015 with the release of One New York: The Plan for a Strong and Just City (the "OneNYC Report"), which represents a long-term plan to address the City's, including DEP's, goals of resiliency, sustainability, equity and growth for the City. The City issues progress reports to the OneNYC Report annually and issues an updated report every four years. The most recent updated report, entitled OneNYC 2050, was issued in April 2019.

As stated in both the OneNYC Report and Volume 7 of OneNYC 2050, the City's climate resiliency planning is based on the climate change impact projections from the New York City Panel on Climate Change ("NPCC"), a body of more than a dozen leading independent climate and social scientists. The NPCC has identified that the City is already experiencing the impacts of climate change and projects dramatic impacts from climate change on the City in the future. Such impacts may include extreme weather, coastal flooding and droughts, which could have a material effect on the operations of the System. The NPCC is required to make recommendations

to the City regarding climate change projections at least every three years, and has published four reports, most recently in March 2019.

In October 2013, DEP released two studies informed by the report issued in June 2013 summarizing certain climate-related impacts on the System's water and sewer assets. The second study, the Phase I Assessment of the Climate Change Integrated Modeling Project, summarized the prospective effects of climate change on the quantity and quality of water on the System's water supply.

Building on the recommendations contained in the reports and plans discussed above, DEP is in the process of implementing climate resiliency projects directed toward mitigating the risks to the System identified in the NPCC report, as well as other risks identified by DEP. Such plans include both stand-alone resiliency projects and the integration of resiliency protection into DEP's ongoing investments. Such projects include structural upgrades and improvements to the Ashokan Reservoir. A portion of the cost of completing such projects is included in the CIP. The total cost of these projects is expected to be substantial. These projects are in various stages of feasibility review, design and construction and/or implementation. Some projects are expected to require additional funding to the extent that they are in the planning stages or current funding does not provide for the costs of construction. In addition to such projects, DEP expects that additional resiliency projects will be identified and implemented in the coming years, addressing the risks identified in the NPCC report, as well as other risks the DEP may identify.

Despite the planning efforts described above, the magnitude of the impact on the System's operations or financial condition from environmental risks is indeterminate and is unpredictable. There can be no assurance that the System will not encounter natural disaster risks such as hurricanes, tropical storms or catastrophic sea level rise in the future or that such risks will not have an adverse effects on the operation or financial condition of the System.

1.3.9 Site of the Former Mt. Kisco Wastewater Treatment Plant

The City operated a wastewater treatment plant in the Village of Mt. Kisco for several decades, which was decommissioned in the 1960s. Elevated radiation levels have been detected at various locations throughout the site, believed to be due to the operations of the Canadian Radium & Uranium Corporation ("CRUC"), which processed radioactive materials at an off-site facility in Mt. Kisco and, it is understood, sent wastewater to the Mt. Kisco wastewater treatment plant for treatment. CRUC is no longer in operation. Based on DEP's operation of the Mt. Kisco wastewater treatment plant, DEP signed an order of consent with NYSDEC. Pursuant to this order, DEP conducted a preliminary environmental study at the site, and DEP submitted its findings to NYSDEC in late 2019. Upon its review of DEP's findings, NYSDEC indicated that further investigations and other actions are required at the site, and that such requirement will be set forth in a new or amended order between NYSDEC and DEP. Accordingly, DEP will likely be required to fund remedial design and remedial action at the site, along with waste disposal. The contaminated material is considered TENORM (technically enhanced naturally occurring

radioactive material) and needs to be disposed of at a waste facility permitted to receive the material. The costs to DEP for remedial design, remedial action and waste disposal could be significant.

1.3.10 Novel Coronavirus

The coronavirus pandemic has had, and is expected to continue to have, negative effects on the City, its economy and the System, including projected revenues of the System. The City has been severely affected by the coronavirus disease, referred to herein as "COVID-19." The Governor declared a state of emergency in the State on March 7, 2020 and the Mayor declared a state of emergency in the City on March 12, 2020, each of which remain in effect. The outbreak of COVID-19 has altered the behavior of businesses and people in a manner that has had, and is expected to continue to have, negative effects on the City and its economy. Drinking water quality and water supply have not been affected by the outbreak of the virus.

DEP is incurring additional operating and maintenance expenses in connection with the City's response to the outbreak of COVID-19, including the costs of facilities disinfection, the purchase of personal protective equipment for employees, and cleaning supplies. DEP currently estimates it will incur less than $3 million of additional expenditures in Fiscal Year 2021 in connection with its response to COVID-19. DEP expects a significant portion of Fiscal Year 2021 expenses related to the COVID-19 response to be reimbursable by the federal government.

1.4 Water Demand Management

Drought situations have necessitated measures to reduce water use by all customers and, at times, have required the use of the Hudson River as an alternative source of supply. DEP has implemented programs to reduce water use to achieve several goals, including the avoidance of the cost and implementation considerations associated with developing new sources of water supply.

Since 1988, the basis for service charges for residential properties in the City has been in a continuous process of transition from a flat-rate basis of annual billing to a meter-based billing system that relies on the actual measurement of usage. Part of this transition has included a Universal Metering Program for all properties to be metered to improve water conservation, water supply system management, and rate equity. Approximately 99% of total accounts have meters installed. Since July 2000, unmetered properties which have not taken steps to install a meter have been required to pay a surcharge doubling their annual water and sewer charge. Commercial accounts are required by the Board and the City to have meters installed for all water services, and substantially all of these accounts are in compliance with this requirement.

DEP completed a program in the 1990s to replace older toilets in the City, as part of which over 1.3 million toilets were replaced. Most recently DEP offered vouchers towards the cost of toilet replacement under a second program that began in 2014 and ran through June 2019. Over 13,000

toilets were retrofitted in the most recent program. Significant long-term reductions in water use have been achieved due to the metering and toilet retrofit programs as well as other initiatives.

DEP's Water for the Future program consists of repair and replacement of portions of the Rondout-West Branch Tunnel, described in Section 1.3.2.1, as well as water supply augmentation projects required to ensure an adequate water supply to the City and its water supply customers north of the City during the shutdown of the Rondout-West Branch Tunnel. Water supply augmentation includes rehabilitation of the Catskill Aqueduct, and demand management measures to encourage in-City and upstate water conservation, including retrofits on City-own facilities.

Additional information concerning water demand management initiatives is provided in Section 4.8.2 of this Report.

1.5 The Roles of the Authority, the Board, and the City in the Water System

Through mid-1985, capital improvements to the water and sewer system of the City were financed through general obligation bonds of the City. In 1984, State law authorized the creation of the Authority and the Board. The Authority's function is to issue revenue bonds, the proceeds of which are used to finance capital improvements to the water and sewer system, including the Water System. The Board sets rates and charges to meet the annual revenue requirements of the water and sewer system. The revenue requirements include debt service (principal and interest) on the debt obligations of the Authority as well as the operation and maintenance expenses of the City. Under an agreement between the Authority, the Board, and the City, the City operates and maintains the water and sewer system and is responsible for implementing capital improvements to the System.

The Authority issued its first revenue bonds in December 1985. As of March 23, 2021, the Authority has approximately $1.2 billion in principal outstanding for its First Resolution revenue bonds and $30.1 billion in principal outstanding for its Second Resolution revenue bonds for the water and sewer system of the City, not including $155.0 million in draws on bond anticipation notes issued to the New York State Environmental Facilities Corporation ("NYSEFC"). In addition, the Authority currently has a $600 million commercial paper program, none of which is currently outstanding. Included within the Second Resolution debt are loans obtained by the Authority at below market interest rates from the state revolving fund ("SRF"). The SRF program is administered by NYSEFC. Tables 5A and 5B in the Appendix to this Report show the original amounts of debt issued by the Authority and NYSEFC, which differ from the amounts noted above as being outstanding.

As of June 30, 2020 (the end of the 2020 fiscal year), the net value of the water and sewer system assets for accounting purposes (i.e., original cost less depreciation) was $32.0 billion. The preceding figures for outstanding debt and net asset value clearly demonstrate that the Authority is amortizing the cost of the assets over the long-term life of the assets.

A portion of the proceeds of the Authority's bonds and the SRF loans has been used to finance capital improvements for water supply projects in upstate regions. Section 4.2.2 of the Report provides information concerning previous capital investments in the Water System. Under the CIP, additional capital improvements are ongoing and planned for the future to preserve the Water System for all customers.

1.6 Additional Information on the Water System, the Board, and the Authority

Information on the System and its operations and maintenance is available on DEP's website: https://www1.nyc.gov/site/dep/index.page

Information on the Board and past reports on the cost of service are available on the Board's website: https://www1.nyc.gov/site/nycwaterboard/index.page

Information on the Authority and the outstanding debt of the System can be found in the Authority's Bond Official Statements, which are available on the Authority's website: https://www1.nyc.gov/site/nyw/index.page

2.0 The Sale of Water to Customers North of the City

2.1 Background

The New York State Water Supply Act of 1905 ("The Act") and subsequent amendments granted the City permission to develop the Catskill and Delaware watershed systems. In return for these development rights, the City was required, upon request, to furnish supplies of fresh water to municipalities and water districts in eight counties directly north of the City in which City water supply facilities and watersheds are located. The Act limits the quantity of water that may be taken or received to the quantity calculated by multiplying the number of inhabitants in the municipality or water district as shown by the last United States, State, or official municipal census by the daily per capita consumption in the City.

Water is supplied to customers north of the City (hereinafter, "upstate customers") on a wholesale basis, i.e., the City delivers water to one or more central locations, and the upstate customers (typically municipalities or water districts) are responsible for distributing the water to individual users such as residential buildings and commercial properties. For the period of 1985 through 2020 inclusive, the City provided an average of 42,669 MG per year of water to upstate customers, or 116.8 MGD. This represented approximately 9.03% of all water supplied to both in-City and upstate customers. The percentage of the annual water supply being used by upstate customers has generally increased from 1985 to the present time, although there may be fluctuations from year to year. In 2019 and 2020, the percentage of the annual water supply being used by upstate customers was 9.16% and 9.52%, respectively. In 2019, the upstate customers' share of the system consumption decreased because upstate communities' consumption declined at a faster pace than in-City consumption. The repair of significant leaks and some shifting of water supply sources ahead of the Delaware Aqueduct shutdown have been identified by NYC DEP as the reasons for the upstate decline. It is anticipated that the lower level of usage will be recurring.

2.2 Rates and Charges for Upstate Customers

The regulated rate for water service to upstate municipalities and water districts is determined on the basis of the actual total cost of water to the City less the capital and operating costs incurred within the City limits in connection with the distribution and delivery of water within the City. In no event may the regulated rate exceed the rate charged to customers within the City.

Prior to 2000, the rates adopted by the Board were based on historical costs and did not reflect the increasing actual cost of service. In order to utilize rates that more appropriately reflected the cost of water supply, the rates adopted by the Board since 2000 have been developed based on the anticipated cost of service in the upcoming fiscal years.

The historical water rates charged to upstate customers for the period 2011 through 2021 are provided in the table on the following page. The reconciliation of revenues and costs from prior years was used by the Board for the first time in setting the 2010 rate based on the actual

revenues and costs for 2008. Sections 4.6 and 4.7 of this Report provide information concerning the calculation of the annual reconciliation.

Historical Billing Rates and Computed Actual Costs ($) Per Million Gallons

Fiscal Year	Adopted Rate Billed to Upstate Customers		Computed Actual Unit Cost to the Board	
	Including effects of reconciliation & the stipulation in 2012		Excluding the effects of reconciliation & the stipulation in 2012	Including the effects of reconciliation & the stipulation in 2012
2011	1,149.72		1,121.04	1,103.65
2012	1,213.84		1,283.45	1,206.06
2013	1,332.30		1,389.42	1,342.15
2014	1,496.76		1,604.43	1,596.62
2015	1,573.61		1,670.85	1,680.78
2016	1,728.99		1,769.49	1,794.55
2017	1,728.99		1,862.60	1,914.52
2018	1,728.99		1,846.08	1,914.27
2019	1,728.99		1,830.75	1,947.65
2020	1,888.06		1,838.52	1,978.07
2021 (Current)	1,888.06		N/A	N/A

(a) The computed actual cost to the Board shown above for 2011 through 2021 includes the upstate share of the costs of defeasance of certain Authority bonds in those years as well as the resulting benefits of defeasance in those years. The basis for this cost is explained in Section 4 of the Report.

(b) The rates adopted by the Board for 2011 through 2016 and 2020 were based on the projected cost and consumption for each respective year and the effects of the reconciliation for the year that was two years' prior to the rate year. The computed actual cost to the Board is shown for those years both excluding and including the effects of the cost reconciliation.

(c) The computed actual cost to the Board in 2012 takes into account the effects of the stipulation credit of $10 million in the column that includes cost reconciliation and excludes the stipulation credit in the column that excludes the cost reconciliation.

(d) The regulated rate of $1,750.52 per MG that was adopted by the Board for 2017 was not implemented.

(e) There was no action taken by the Board for the regulated rate in 2018 and 2019. The unit rate that was used in 2018 and 2019 for billing purposes is the same as the regulated rate that was adopted on July 1, 2015 of $1,728.99 per MG.

(f) There was no change for the regulated rate in 2021. The unit rate for 2021 for billing purposes is the same as the regulated rate that was adopted on July 1, 2019 of $1,888.06 per MG.

The cost to the Board per MG for 2020, using actual cost of service and excluding the reconciliation, is $1,838.52, which is lower than the unit rate that was adopted by the Board effective July 1, 2019 of $1,888.06. After application of the reconciliation cost, the net computed cost to the Board is $1,978.07 per MG. The actual costs for 2020 were slightly lower than the projected costs for 2020 at the time when the report for 2020 rates was prepared (the Amawalk report of April 2019). It is apparent that a combination of factors impact the actual cost per MG as summarized below.

- Other Than Personal Services costs for facilities north of the City were slightly lower than anticipated;
- Debt service costs were much lower than anticipated;
- Water consumption was lower than projected, which serves to increase the unit cost per MG.

The following paragraphs address the reconciliation or "true-up" of costs and revenues.

The reconciliation amount for 2014 of about $40.7 million, i.e., the difference between the cost of water supply service (including the 2012 reconciliation) and the total revenues generated by the regulated rate (for both in-City and upstate consumption), was phased-in over four years by applying the amount due in four equal annual installments to the cost of service for 2016 through 2019 (about $10.2 million per year for each of the four years). The effects of this reconciliation increased the actual unit cost for 2016; although the impact is much less than if the entire reconciliation amount of $40.7 million was applied to the cost of service in 2016. The unit cost in 2016 with and without the effects of reconciliation is higher than the unit rate that was adopted by the Board.

The reconciliation amount for 2015 of about $43.6 million was phased-in over four years by applying the amount due in four equal annual installments of about $10.9 million to the cost of service for 2017 through 2020. The effects of this reconciliation increased the actual unit cost for 2017; although once again the impact is much less than if the entire reconciliation amount was applied to the cost of service in 2017. The unit cost in 2017 with and without the effects of reconciliation is higher than the unit rate that was charged by the Board.

The reconciliation amount for 2016 of about $26.6 million is phased-in over four years by applying the amount due in four equal annual installments of about $6.7 million to the cost of service for 2018 through 2021. In a similar manner, the reconciliation amount for 2017 of about $75.3 million is phased-in over four years by applying the amount due in four equal annual installments of about $18.8 million to the cost of service for 2019 through 2022. The unit cost with and without the effects of reconciliation is higher each year in 2018 and 2019 than the unit rate that was charged by the Board.

The reconciliation amount for 2018 of about $75.3 million (the amount is similar to the prior year) is also phased-in over four years by applying the amount due in four equal annual installments of about $18.8 million to the cost of service for 2020 through 2023. The unit cost in 2020 with the effects of reconciliation is higher than the unit rate that was charged by the Board.

The reconciliation amount for 2019 of about $87.1 million is also phased-in over four years by applying the amount due in four equal annual installments of about $21.8 million to the cost of service for 2021 through 2024. The reconciliation amount for 2020 of about $35.6 million is also proposed to be phased-in over four years by applying the amount due in four equal annual installments of about $8.9 million to the cost of service for 2022 through 2025.

As of the date of this Report, it is estimated that the 2021 computed unit cost to the Board (with the effects of reconciliation) will be higher than the unit rate that was in effect for billing purposes. The principal reasons are: the recovery of reconciliation costs, lower consumption in 2021 (the denominator in the rate calculation), and the regulated rate remained constant from July 1, 2019 to June 30, 2021.

Debt defeasance that was completed in previous years reduced debt service in multiple years beginning in 2012. The cost of defeasance together with the projected lower debt service payments that result from defeasance are incorporated in the estimated costs of water supply service in 2018 through 2025 as presented in this Report.

Apart from the effects of defeasance, the Authority has successfully sold bonds and commercial paper in recent years and sold bonds again in 2020 and in 2021 at average interest rates that were lower than those previously assumed, which serves to reduce the projected debt service and benefits the cost of service in 2020, 2021 and subsequent years.

The calculated unit rate is affected by projections of total water use. The current estimate of the cost per MG for 2021 is based on the estimated annual costs divided by the full-year water consumption estimate that is derived from a 5-year regression analysis. A 10-year regression analysis was used in prior years. Given the relatively flat to slow pace of decline in consumption in recent years, a 5-year regression is used to better project current and upcoming consumption patterns. If the water demand for the full year is lower than projected, the unit cost per MG (i.e., Total Costs for Facilities North of the City divided by the Total of in-City and Upstate Consumption) will be greater. The actual cost of service and the actual unit rate for the supply of water for 2021 will not be known until after the fall of 2021. It is possible that System-wide consumption in 2021 and 2022 will be lower than projected due to the long-term effects of COVID-19; such reductions would serve to increase the unit rate for water supply service.

This Report again proposes that a reconciliation and “true-up” be applied towards the cost of service in 2022 to reflect the calculated difference between the 2020 computed actual cost of service and the actual costs recovered through the adopted rate of the Board, which is computed by multiplying the unit rate charged by the Board in 2020 times System-wide water consumption. The reconciliation of 2020 revenues and costs results in a charge which will be added to the projected cost of service for 2022. The proposed “true-up” methodology for the 2020 reconciliation again spreads the incremental cost over a four-year period. The calculations are presented in Sections 4.6 and 4.7 herein.

3.0 Cost of Service Methodology

3.1 Overview

This Section of the Report provides a summary of the steps that were followed to calculate the cost of service for water supply. The cost of service is calculated in accordance with the cash basis methodology used and approved by NYSDEC in 1972 and 1995. The methodology is also consistent with that used to calculate the regulated rates, which were adopted and implemented for 1993 through the current year. Pursuant to the Act, the cost of service methodology excludes all capital and operating costs incurred for transmission and distribution mains, repair yards, tunnels, shafts, and related facilities within the City in connection with the distribution and delivery of water within the City. The cost of service takes into account offsetting revenues from hydropower and permit fees. The cash basis methodology is consistent with industry guidance provided by the American Water Works Association ("AWWA").

3.2 Procedures for Calculating the Cost of Service

Several steps are required to calculate the total cost of providing water to upstate customers and the regulated rate. These steps account for the many types of costs incurred by the City in establishing and maintaining reliable sources of drinking water. The approach that is used in this Report, as required by the 1905 Act, specifically excludes costs incurred within the City that are associated with the transmission and distribution of water in the City.

The six steps that were followed in developing the cost of service and the calculated regulated rate for upstate water supply are outlined herein. The first five steps relate to the computation of the cost of service and regulated rate for 2018 through 2020. The sixth step includes the development of the projected cost of service and regulated rates for 2021 and 2022. In addition, this Report includes a preliminary projection of the regulated rate for water supply service for the years 2023 through 2025. The projections are preliminary and subject to change. Changes in System-wide water consumption as well as assumptions concerning increased costs for property taxes, watershed protection, required capital improvements, and other factors have been taken into consideration in developing the projected cost of service and rates. Nonetheless, rising commodity prices and other factors affecting operating expenses and capital costs as well as changes in consumption may result in a larger increase in the cost of water supply in future years than is currently reflected in the 2021 through 2025 projections. It is noted, for example, that the price of crude oil is significantly higher at the time of this Report compared to one year earlier. The Water System costs, offsetting revenues, and related information corresponding to each of the steps can be found in Section 4.0 and the Appendix of this Report.

3.2.1 Step A

The initial step includes the determination of all direct costs and offsetting revenues that relate solely to facilities located north of the City.

The components of this analysis include the following:

1. Other Than Personal Services ("OTPS")
2. Debt Service
3. Judgments and Claims
4. Miscellaneous Revenue
5. Personal Services ("PS"), which include:
    a. Field Worker Personnel
    b. Executive and Administrative Personnel

It is noted that the reference to Debt Service above includes not only debt service but also cash-financed construction and defeasance.

3.2.2 Step B

The second step includes the calculation of the allocation percentages to be used in Steps C and D. The allocation percentages are based upon total salaries, or the number of vehicles, depending upon which allocation methodology is most appropriate to the costs being allocated. The methodologies used in the allocation process have previously been accepted by NYSDEC in its 1995 decision and upheld by the Appellate Division of the Third Department concerning the regulated rates for 1993 and 1994.

3.2.3 Step C

The next step in the cost of service process is to determine the costs of DEP support services and other essential functions that must be allocated to the cost of supplying water. These costs fall into two categories:

1. Personal Services
2. Other Than Personal Services

The cost of support services and related functions of DEP must be shared by all customers who benefit from its services. Therefore, the costs must be allocated to facilities located north of the City using the appropriate allocation percentage calculated in Step B.

3.2.4 Step D

The fourth step involves the identification of the City's Central Service costs that must be allocated to the cost of water supply. The City's Central Service costs are those related to general City services (e.g., accounting, budgeting, personnel, legal) that are provided to the Water System as well as to DEP as a whole and to other City agencies. Therefore, these costs are allocated first among all City departments. The DEP share (calculated using an allocation percentage developed in Step B) is then allocated to facilities located north of the City.

3.2.5 Step E

The total cost of supplying water to both in-City and upstate customers, exclusive of in-City distribution costs, is determined by adding the cost of service elements, which are calculated in Steps A, C, and D. Dividing the total cost of service by total water consumption determines the unit cost per MG related to the supply of water. The upstate water consumption times the unit cost or regulated rate per MG results in the total costs attributable to upstate customers.

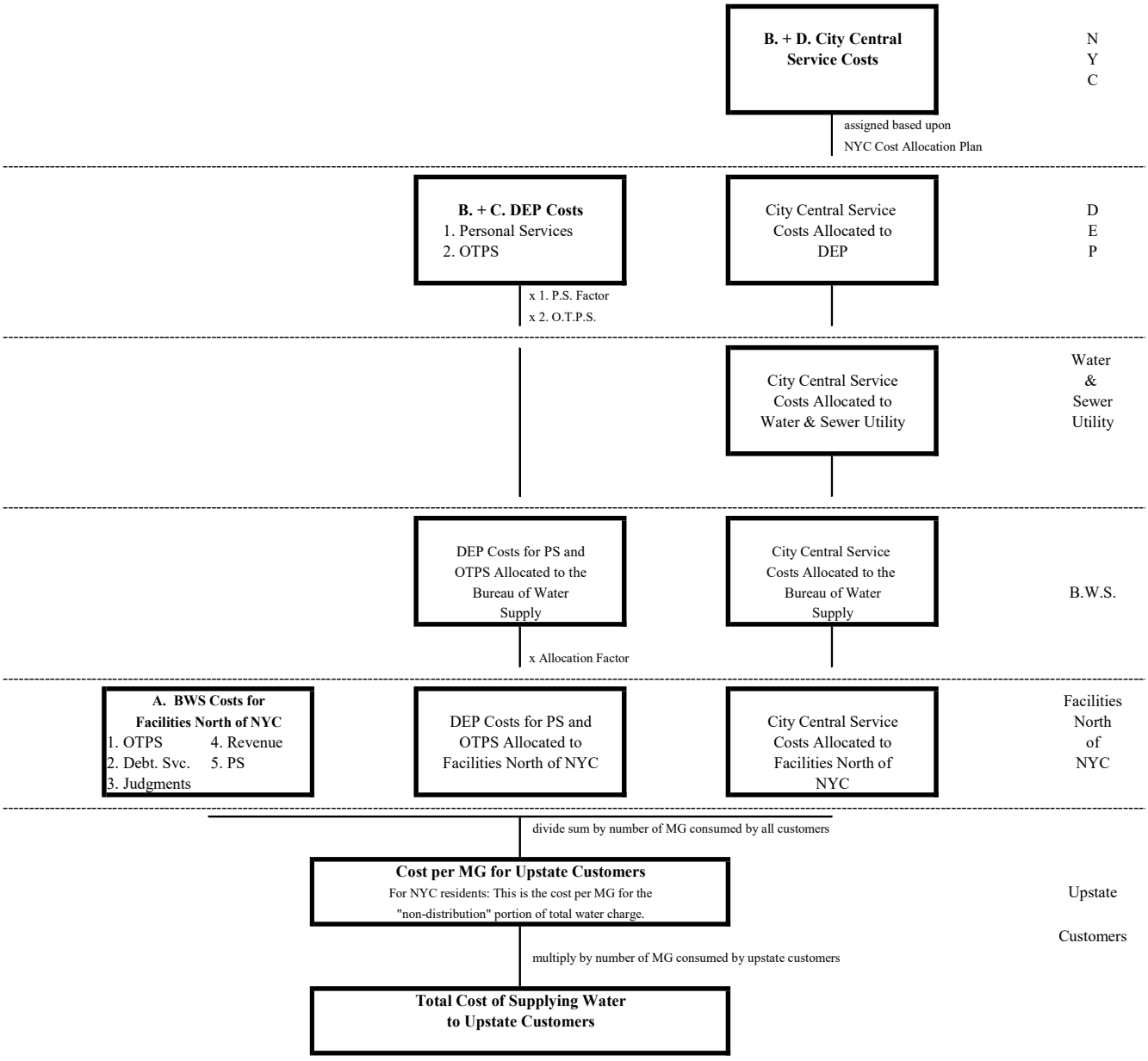
3.2.6 Step F

Steps A through E are primarily used to develop the actual cash basis cost of service for 2018 through 2020. To develop the projected cost of service for 2021 and 2022, known debt service costs are added to anticipated future debt service plus cash-financed capital and/or defeasance costs plus anticipated operation and maintenance expenses, less expected offsetting revenues. Projections of future expenses and revenues are based on historical experience as well as known changes in programs and costs that are expected in 2021 and 2022. This is a standard and accepted practice in the industry and is consistent with the methodology used to develop water and sewer rates for in-City customers. The projected cost of service is divided by the estimated water consumption to determine the regulated rate. Step F is carried out simultaneously with the work performed in Steps A through E.

3.2.7 Graphical Overview

Figure 2 on the following page provides a graphical presentation of how various components of the cost of service are allocated in the development of the cost of providing water to upstate customers.

Figure 2 Diagram of Calculation



3.3 Computation of the Regulated Rate

The regulated rate per MG of water use is computed on the basis of the total cost of service (including the effects of prior year reconciliations) divided by the total water consumption:

Total Cost of Service *divided by* Total Water Consumption = Unit Cost of Service or Regulated Rate

The costs, and thus the revenue requirements, attributable to upstate customers are computed on the basis of the total annual quantity of water used by upstate customers multiplied by the unit rate per MG:

Upstate Consumption *multiplied by* Unit Cost of Service or Regulated Rate = Upstate Cost of Service

The total cost of service for water supply, or revenue requirements, is allocated between upstate and in-City customers as follows:

Upstate: **Total Cost of Water Supply Service *multiplied by*:** $\frac{\text{Upstate Consumption}}{\text{Total System Consumption}}$

In-City: **Total Cost of Water Supply Service *multiplied by:*** $\frac{\text{In-City Consumption}}{\text{Total System Consumption}}$

3.4 Sources of Data and Basis of Presentation

Information presented in this report was obtained from records of the City. The City utilizes a modified accrual basis of accounting for its costs. Operation and maintenance expense information, including cost allocation factors, was provided by DEP. Debt service, defeasance, cash-financed construction and interest earnings information was obtained from the Authority. Pension and fringe benefit cost factors were provided by the New York City Office of Management and Budget. Water consumption information was provided by DEP.

4.0 Computation of the Cost of Service and the Regulated Rate

4.1 Introduction

This Section of the Report describes the individual elements of the cost of service. The most recent fiscal year for which complete information is available is 2020; thus, the costs for 2020 serve as a base for projecting costs in 2021 and subsequent years.

The anticipated cost of service for 2021 and 2022 is presented using the following components of cost: scheduled debt service payments on outstanding bonds for these years, the anticipated debt service from additional bonds of the Authority that are expected to be issued, the expected payments for cash-financed construction or defeasance, the projected benefits of defeasance in the form of reduced debt service, and projections of operating expenses and all other components of the cost of service. Additional bonds reflect the expected future issuance of debt by the Authority, the proceeds of which will be used, in part, to fund capital improvements in the Water System. The projected debt service reflects the expected portion of the bond proceeds that will be used for the Water System. The findings of each significant step of the analysis are presented in this Section, and the basis for projecting the cost of service for 2021 and 2022 is also provided. Where appropriate, we normalize the cost of service to take into consideration one-time or recurring increases or decreases in costs.

Supporting tables for each step of the analysis are referenced in this Section and presented in detail in the Appendix to the Report.

4.2 Bureau of Water Supply Costs Related to Facilities Located North of the City - Step A

BWS has the responsibility to operate and maintain the Water System of the City. This responsibility also includes the development and implementation of capital improvements to the System so that a reliable supply of quality water can be maintained for customers both within the City and in upstate communities.

BWS carries out its water supply responsibilities through personnel and equipment located at facilities throughout the watershed. BWS personnel include engineers, laboratory technicians, security personnel, water quality experts, and management and support personnel. The vast majority of BWS's costs relate solely to facilities located north of the City.

4.2.1 Other Than Personal Services Costs

By definition, OTPS costs include all operating expenses other than labor including, but not limited to: supplies, equipment, contracted maintenance and repairs, power, chemicals, real estate taxes paid to upstate communities, and other purchased goods and services. Direct OTPS costs have generally increased over the years through 2020, as illustrated in the table shown herein. In 2015, 2018, and 2019, there were small decreases in expenses relative to the prior years. The average annual increase from 2011 to 2020 is 3.9%.

Property taxes constituted about 66.9% and 61.6% of total OTPS costs allocable to the cost of water supply and the unit rate in 2019 and in 2020, respectively. OTPS expenses include certain costs associated with filtration avoidance and environmental health and safety in the watershed. The expenses also include the estimated costs associated with Hillview Reservoir, which were approved by NYSDEC for inclusion in the cost of service in April 1997. Additional information concerning these expenses is presented in this Section of this Report.

Historical OTPS Expenses

Fiscal Year	OTPS Expense ($)	Annual Increase (%)
2011	191,435,944	12.6
2012	202,687,321	5.9
2013	221,323,950	9.2
2014	239,487,897	8.2
2015	236,831,336	-1.1
2016	245,811,541	3.8
2017	251,744,977	2.4
2018	250,053,638	-0.7
2019	246,767,015	-1.3
2020	269,272,257	9.1

Changes in expenses are reviewed for each category with a particular focus on the following: property taxes, the UV Facility, FAD-related costs, Hillview expenses, contractual services, environmental health and safety programs, fuels, chemicals, and utilities.

Recent expenses and current and ongoing programs were considered in estimating the anticipated 2021 and 2022 OTPS expenses. The findings of the analysis are presented in the following categories:

1. Real Estate Taxes
2. Chemicals
3. Hillview Reservoir
4. Contractual Services
5. UV Facility
6. Filtration Avoidance
7. Other OTPS Expenses

The analysis considered the historical experience in each of these categories together with current and expected future changes so that such costs can be normalized, where appropriate, to exclude unusual increases or decreases that may have affected recent experience. Overall, OTPS expenses are expected to increase in future years due to rising property taxes, continuing expenses related to FAD, the cost of operating and maintaining the UV Facility, and other

factors. The classification of certain filtration avoidance costs and other costs previously paid for through the proceeds of debt as operating expenses instead of capital costs also contributes to the anticipated increases in the cost of service since such costs must be expensed in the year they are incurred instead of being amortized over the term of the debt.

Upcoming changes are briefly outlined in this paragraph. DEP has advised that, in late 2021, it expects to begin operating a new Catskill Chlorination Facility. Also in 2021, DEP expects to begin operating a new chlorine dioxide facility located at the New Croton Reservoir. These represent recurring operations and associated expenses. The estimated operating expenses for the new facilities are shown herein in Table 4B.

As part of the Water for the Future Program, DEP has undertaken a series of water conservation programs both with the upstate communities and in anticipation of Delaware Aqueduct shutdown in 2023.

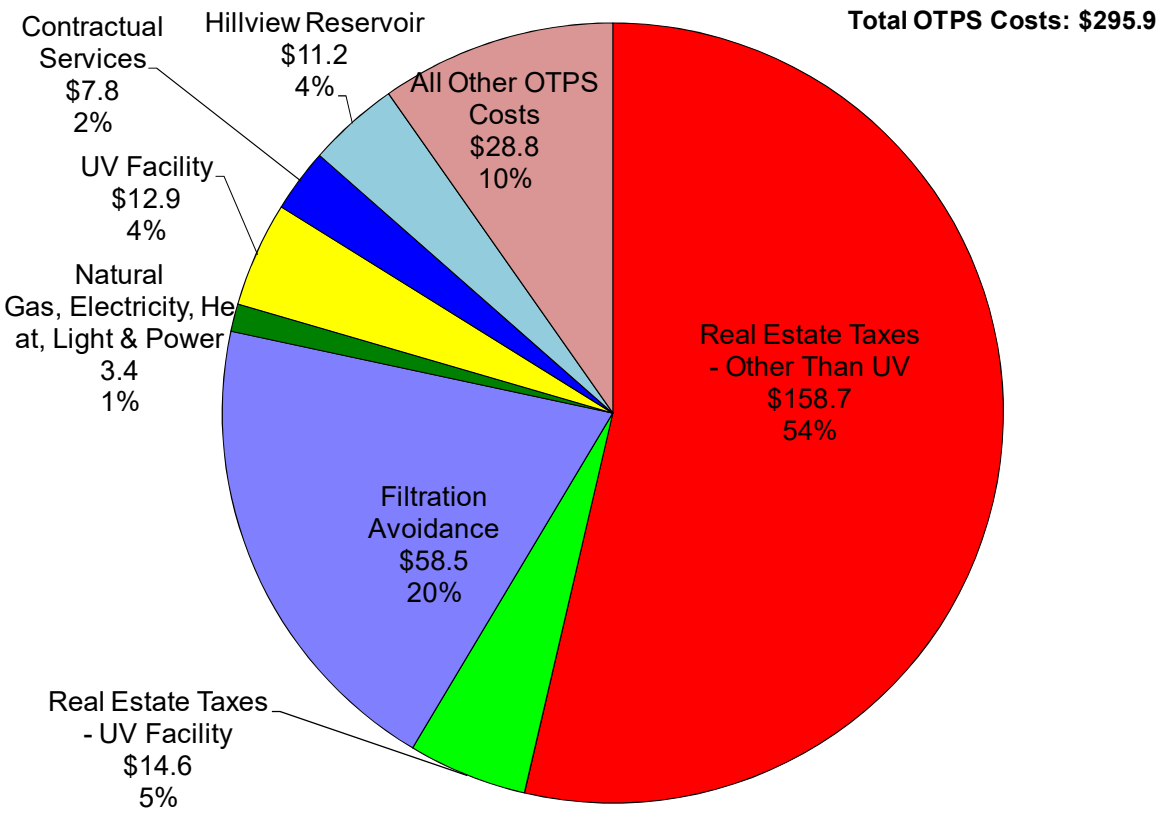
The major components of the anticipated 2022 OTPS costs are summarized in Figure 3. Table 4A of the Appendix presents a detailed listing of historical OTPS expenses while Table 4B provides a detailed listing of the projected OTPS expenses.

It is noted that the cost of chemicals used at Hillview Reservoir is included in the total costs for Hillview and is not included in the cost category for chemicals used at all other water supply facilities. Electricity costs for the UV facility are also reported separately from other heat, light and power costs. Electricity costs in 2019, 2020 and future years exclude treatment-related expenses within the City recognizing that such costs are not attributable to the transport or distribution of in-City water.

Oil prices increased significantly from around the beginning of calendar year 2016 to the beginning of October 2018 before declining substantially through April 2020. As noted earlier, recent prices are much higher than those of one year ago. It is not known whether past increases or decreases are temporary or permanent and the effect such fluctuations might have on the cost of fuel oil, gasoline, chemicals and other commodities.

Figure 3 Projected 2022 Other Than Personal Services Costs

(all amounts in millions; totals may not add due to rounding)



4.2.1.1 Real Estate Taxes

Real estate taxes for all water supply properties, including the UV Facility, have increased at the average annual rate of about 2.6% from 2011 to 2020. Given the rate of increase in recent years, this Report assumes an annual property tax increase of 2.5% per year. This rate applies to all properties except the UV Facility in 2021 through 2025. The assumed percentage change in taxes on the UV Facility is a decrease of 3.8% as budgeted by DEP for 2021 and then an increase of 2.5% per year thereafter. The overall increase in recent years reflects a combination of both increases in the local tax rates applied to water supply properties as well as taxes on newly purchased properties in the watershed. Historical property tax payments, which include property taxes for the UV Facility beginning in 2011, are shown in the next table.

In 2019 and in 2020, the City received about $3,000 and $311,000, respectively, in refunds from upstate taxing jurisdictions (for taxes paid in prior years). Although such refunds have occasionally been reflected as amounts received in prior reports in Table 7, the tax refunds received in 2019 and 2020 were used to reduce the 2019 and 2020 property tax expenses; so they are not shown separately but are reflected instead as an offset to expenses in Table 4A (this is the

typical method of applying the proceeds of tax refunds). Tax refunds are not assumed to occur in future years.

Historical Property Tax Payments

Fiscal Year	Property Tax Expense ($)	Annual Increase (%)
2011	131,663,054	4.2
2012	139,186,474	5.7
2013	147,798,234	6.2
2014	155,494,475	5.2
2015	153,957,580	-1.0
2016	157,879,279	2.5
2017	159,563,884	1.1
2018	162,966,465	2.1
2019	165,142,095	1.3
2020	165,902,001	0.5

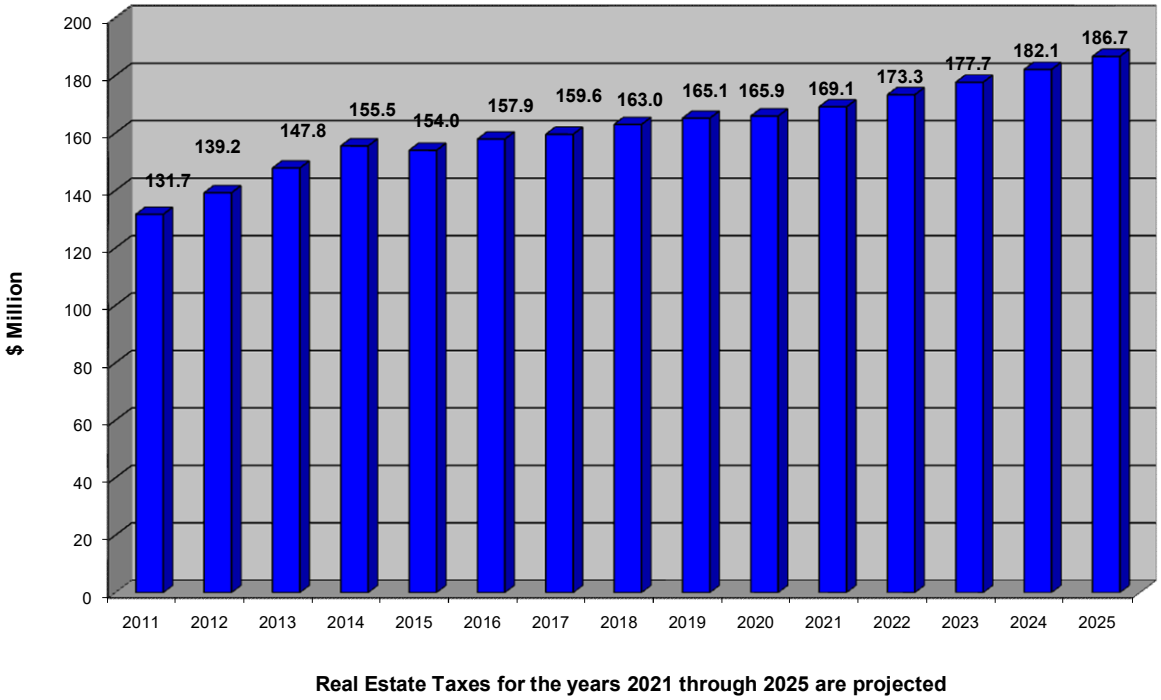
The projected real estate taxes for 2021 and 2022, including the taxes on the UV Facility, are $169.1 million and $173.3 million, respectively. Both estimates reflect an allowance for the expected increases in property tax rates and the taxes on newly-purchased land. To protect water quality in the watershed and comply with the 2017 FAD, the City is required to increase the number of acres of land that are either owned by the City or otherwise restricted in terms of land use. Increasing the number of acres owned by the City results in increased property taxes.

While the current rate consideration by the Board will only address 2022, projections for 2023 through 2025 are shown for illustrative purposes. The actual and estimated real estate taxes payable to upstate communities for watershed properties from 2011 through 2025, including the UV Facility, are summarized in Figure 4.

It is important to note that property taxes associated with the UV Facility are included in a separate line item for UV real estate taxes in Tables 4A and 4B. Section 4.2.1.5 provides additional information concerning the UV Facility.

Figure 4 **Real Estate Taxes for the Water System**

(all amounts in $ millions)



4.2.1.2 Chemicals

Several chemicals are used by the City to treat the water supply, including chlorine that is used for disinfection and other purposes. This part of the Report addresses the chemicals used in the watershed, except for those used at Hillview Reservoir, which are presented separately in Section 4.2.1.3. As illustrated by the following table, the total cost of chemicals varies from year to year.

Historical Chemical Costs

Fiscal Year	Chemical Costs ($)	Annual Rate of Change (%)	Chemical Costs as a % of Total
2011	6,744,998	-13.7	3.5
2012	6,008,103	-10.9	3.0
2013	3,033,060	-49.5	1.4
2014	3,611,336	19.1	1.5
2015	4,095,234	13.4	1.7
2016	3,681,482	-10.1	1.5
2017	3,649,465	-0.9	1.4
2018	2,106,988	-42.3	0.8
2019	1,996,333	-5.3	0.8
2020	2,020,930	1.2	0.8

The cost of chemicals for water supply in a given year is dependent upon both the quantities of chemicals that must be used as well as the unit price per ton. There were significant increases in

prices for fluoride and chlorine for the System, excluding Hillview Reservoir, starting in 2008. Unit prices declined over time and there were significant reductions beginning in 2018 for both chlorine and fluoride. Following approvals from the NYCDOH, DEP reduced the fluoride dosage from 1.0 milligrams per liter to 0.8 milligrams per liter in February 2012 and then to 0.7 milligrams per liter in May 2015. In 2013, chemical deliveries to the System were slowed due to System repairs. The quantities of chemicals used and the applicable unit prices in recent years are summarized in the following tables.

Historical Chemical Use

Fiscal Year	Chlorine (Lbs)	Fluoride (Tons)
2011	3,036	1,393
2012	3,177	1,512
2013	2,058	787
2014	1,647	1,313
2015	1,567	1,531
2016	1,938	1,257
2017	1,993	1,211
2018	2,140	1,449
2019	2,373	1,220
2020	2,271	1,244

Historical Unit Prices for Chemicals

Actual chemical expenses in 2013 through 2020 were much lower than in 2012 and prior years.

Fiscal Year	Chlorine ($)/Lb	Fluoride ($)/Ton (1)
2011	474.98	3,797.88
2012	504.84	2,944.14
2013	480.00	2,600.00
2014	467.18	2,165.17
2015	459.63	2,159.67
2016	499.65	2,159.29
2017	524.51	2,150.43
2018	319.37	982.43
2019	336.50	982.13
2020	336.50	1,010.22

However, such expenses in a given year could increase at a rate that is beyond the 3.0% allowance for inflation (as they did in 2014 and 2015). Thus, the assumed rate of increase in chemical costs in 2021 through 2025 is 3.0% per year. This assumption recognizes that there is a degree of uncertainty at this time as to whether prices will stay the same, increase, or decline in

future periods. Chemical addition that solely benefits in-City customers is excluded from this cost of service analysis.

4.2.1.3 Operating Expenses Associated with Hillview Reservoir

The principal expenses incurred in the operation of Hillview Reservoir are associated with chemical addition and security. Caustic soda is added for water quality purposes to adjust the pH of the water entering Hillview. Orthophosphate is added for lead and copper control. In 2019, the costs for caustic soda and orthophosphate were $4.6 million and $4.4 million, respectively. In 2020, the costs for caustic soda and orthophosphate were $3.5 million and $4.6 million, respectively. These costs will fluctuate due to market prices. The unit bid prices for orthophosphate effective June 1, 2018, June 1, 2019, and June 1, 2020 were $2.78 per gallon, $2.81 per gallon, and $2.97 per gallon, respectively. DEP estimates that the unit bid price for orthophosphate effective June 1, 2021 will be $3.26 per gallon.

All OTPS expenses at Hillview, including chemical costs, are assumed to increase at the rate of 3.0% per year in 2021 through 2025. Market conditions and recent and upcoming bid prices will dictate the actual prices for chemical costs. Future increases in expenses at Hillview could be significantly affected by fluctuations in the price of chemicals and other factors.

The non-labor expenses attributable to Hillview Reservoir in Tables 4A and 4B are exclusive of property taxes, which are included in the "Real Estate Taxes – Existing Properties" line item (line 17). Labor costs for Hillview are included in the personal services costs described in Section 4.2.5 of this Report.

4.2.1.4 Contractual Services

The City was required by the MOA to fund a number of capital projects and operating programs to support the protection of the watershed. Programs to be paid from operating funds began in 1997, and beginning in 2004, the expenses related to the MOA declined as the programs it called for ended or were scaled down. The future expenses for MOA-related programs are reflected in the "Contractual Services – General" line item of the projected OTPS expenses in Tables 4A and 4B. Contractual services expenses are assumed to increase at the rate of 3.0% annually. Other expenses related to filtration avoidance are addressed in Section 4.2.1.6.

4.2.1.5 UV Facility

The UV Facility provides treatment for Catskill and Delaware water. Operating expenses other than labor associated with the UV Facility are shown on line 27 of Tables 4A and 4B with the exception of property taxes (shown on line 18).

DEP began to pay property taxes for the UV Facility in 2010. OTPS expenses other than property taxes were incurred beginning in 2012. The projected operational expenses associated with the UV Facility in 2021, including property taxes, are based on DEP budgeted amounts. OTPS expenses are then assumed to increase at the rate of 3.0% per year while property taxes, as noted earlier, are assumed to increase at the rate of 2.5% per year in 2022 through 2025.

4.2.1.6 Filtration Avoidance

OTPS expenses in 2018 through 2020 and future years include DEP costs associated with filtration avoidance programs in the watershed. These are shown in lines 28 and 29 of Tables 4A and 4B. Included within the costs of filtration avoidance are payments for the operation and maintenance of certain wastewater treatment facilities that are not owned by DEP. The operation and maintenance of such facilities is intended to protect the water quality in the watershed.

Payments from DEP to watershed communities under the MOA and the cost of other initiatives that help support the avoidance of filtration are also included within the filtration avoidance line items. Some program costs for filtration avoidance were historically funded through the proceeds of debt and then paid back through debt service on the bonds that were issued. As a result of a decision by the New York City Office of the Comptroller, such costs are assumed to be funded as operating expenses in the current year and future years. It is assumed that the percentage of debt attributable to the Water System will be affected slightly in future years as a result of this policy; an adjustment is outlined in Section 4.2.2.2 of this report. The expenses associated with program funding of filtration avoidance in both lines 28 and 29 are assumed to increase at the rate of 3.0% per year.

4.2.1.7 Other OTPS Expenses

It is anticipated that there will be new facilities in the watershed in 2021: the Catskill Chlorination Facility located in Ulster County and the chlorine dioxide facility located at New Croton Reservoir are both expected to begin operations in 2021. The projected costs for the new facilities are included in line 30 of Tables 4A and 4B starting in 2021. Given the absence of historical operating experience, the projected annual costs are kept constant through 2025.

The projected costs for the Water for the Future Program, as provided by DEP, are included in line 31 of Tables 4A and 4B starting in 2018. As part of the Water for the Future Program, DEP has undertaken a series of water conservation programs with the upstate communities in anticipation of Delaware Aqueduct shutdown starting in 2023.

In recent years, DEP has undertaken a comprehensive program of environmental health and safety; the water supply-related costs of this program are included in line 32 of Tables 4A and 4B. The expenses for environmental health and safety programs in the watershed and the costs of other categories of expense (except cost of service and rate studies as discussed below) are assumed to increase at the rate of 3.0% per year.

The annual costs associated with performing the cost of service and rate study and related work for establishing the regulated rate for upstate customers, including, but not limited to, the distribution of documents, posting of notices, and the rate hearing, are included in line 25 of Tables 4A and 4B. In 2020, the actual expenses for the cost of service and rate study as well as consulting assistance relative to the petition of upstate customers were $148,408. In 2021 and 2022, it is assumed that the total expense of the cost of service and rate study will be $100,000

and $80,000, respectively. The estimated cost in 2022 is assumed to increase thereafter at the rate of 3.0% annually.

It is noted that no extraordinary OTPS expenses are assumed in the water supply cost of service calculations due to the effects of COVID-19; this assumption is subject to change depending upon the actual effects that are experienced.

4.2.2 Debt Service/Capital Improvement Financing

Capital improvements to the System are financed principally through proceeds from the sale of bonds. The use of long-term bonds as a source of financing spreads the cost (in the form of debt service) over the life of the facilities, which enables the long-term users of the water supply system to contribute to its cost. A relatively small portion of the capital improvements are financed on a cash basis using funds from revenues of the System. This part of the Report describes the methodology that is used to develop the annual debt service requirements (i.e., the principal and interest payments on bonds) of the Water System as well as the annual revenues raised for use in the CIP. Table 5C provides a summary of the actual debt service for 2018 through 2020, as well as the projected amounts for 2021 through 2025, with the net debt service attributable to the Water System shown in line 28. The debt service amounts are then reflected in line 2 of Tables 1A and 1B, which summarize the annual cost of water supply service and the regulated rate. Lines 3a and 3b of Table 1A and line 3 of Table 1B present the water supply portion of the amounts used (if any) for cash-financed construction and to defease Authority bonds. The costs and benefits of defeasance are described later in this section.

4.2.2.1 Historical Investments in the Water System

Prior to the formation of the Authority, the development, expansion, and upgrading of the Water System was carried out by the City with funds that were typically provided by the proceeds of General Obligation (G.O.) bonds issued by the City. Since the formation of the Authority, significant investments have been made throughout the Water System principally through the proceeds of bonds issued by the Authority. These capital costs, which are reflected in debt service on bonds of the Authority issued both to the public ("Authority Bonds") and NYSEFC ("NYSEFC Bonds") (collectively the "Bonds"), are a component of the cost of service and regulated rate.

Investments that are either complete or in progress include improvements to: dams, reservoirs, reservoir roads and bridges, City-owned and non-City wastewater treatment plants, agricultural programs (i.e., pollution prevention for watershed protection), security, the UV Facility, and other capital needs, including the Water for the Future Program. The latter program consists of all work related to the Rondout-West Branch Tunnel, as well as supply augmentation projects required to ensure an adequate water supply during the shutdown of the Rondout-West Branch Tunnel. Water supply augmentation includes rehabilitation of the Catskill Aqueduct, and demand management measures to encourage water conservation. Capital costs for the Croton Plant prior to the approval of the in-City site are also included in the water supply cost of service and are

allocated to all water supply customers; capital costs incurred following the approval of the site are not included in the calculation of the cost of service or the regulated rate.

Land purchases, improvements to wastewater treatment plants, and other investments have been instrumental in maintaining the quality and reliability of the System including the avoidance of filtration for the Catskill and Delaware Systems.

4.2.2.2 Debt Service Related to the Water System

Debt service on the Bonds is computed based on the total net debt service payable for the water and wastewater system of the City in each year times the percentage attributable to the water supply portion of the capital improvements that have been financed with the proceeds of the Bonds. This approach incorporates the savings resulting from refundings of previously-issued Bonds. It also includes the beneficial impacts of the defeasance of certain future debt service obligations of the Authority.

The current methodology for computing debt service on outstanding Bonds was first applied in 2005. This methodology begins with the calculation of the percentage of the capital investments beginning in 1986 that are attributable to the System versus other components of the water and sewer system of the City. Since improvements have been financed with the proceeds of Authority Bonds and NYSEFC Bonds, Tables 5A and 5B were prepared to illustrate the proceeds of each bond issue and the upstate portion of such proceeds for Authority Bonds and NYSEFC Bonds, respectively. Since the percentage share for the Water System will change from year to year, a cumulative percentage (beginning with the first bonds issued in 1986) is computed in each year through the beginning of 2021. For example, the cumulative percentage to be used in 2020 for Authority debt reflects the sum of all Authority bond proceeds used for water supply projects from 1986 through 2019 divided by the sum of all proceeds from bonds issued from 1986 through 2019. The calculated percentage that is used in 2020 is again applied in Table 5C to the appropriate debt service, interest earnings, etc. for 2020. Not all of the proceeds of the 2020 and 2021 debt issuances may have been spent at the time the data was prepared for this Report; the figures presented are subject to change.

The water supply share of debt service and net offsets are computed by multiplying the System-wide totals for each category times the applicable percentage in each year. The three percentages shown in Table 5C are: (1) line 29, which shows water supply capital costs funded through Authority Bond proceeds as a percentage of total capital costs funded through Authority Bond proceeds; (2) line 30, which shows water supply capital costs funded through both Authority Bond proceeds and NYSEFC Bond proceeds as a percentage of total capital costs funded through both Authority Bond proceeds and NYSEFC Bond proceeds; and (3) line 31, which shows water supply capital costs funded through NYSEFC Bond proceeds as a percentage of total capital costs funded through NYSEFC Bond proceeds.

Starting in the rate report for Fiscal Year 2014, we used the average of the percentages from the two prior historical years for debt service in future years. Thus, for 2022 through 2025, we use

the average of the calculated percentages for 2019 and 2020. No further increases in the allocation percentages are assumed at the time of this Report for the following reasons: (1) previous years included debt issued for the UV Facility, which is now in operation; and (2) the classification of certain filtration avoidance programs as operating expenses instead of capital projects results in an increase in operating expenses but also a reduction in the amount of bond proceeds that will be needed for filtration avoidance expenses in the Water System. It is recognized that the capital costs for the Water for the Future Program have been and are being incurred in support of the Delaware Aqueduct shutdown; such costs may influence the allocation percentages somewhat in the next few years. The computed percentages for 2021 through 2025 are preliminary and subject to change.

Table 5C illustrates the current projections of debt service on outstanding bonds and anticipated future bonds for the Projection Period as of April 30, 2021. The amounts shown are net of all refundings and defeasance of debt that have been undertaken by the Authority prior to that date. Authority debt service is shown as First Resolution and Second Resolution. The Second Resolution debt is subordinate to the First Resolution debt. Table 5C also presents the estimated interest on commercial paper shown as "Interest on Short-Term Debt". Historically, the Authority initially finances capital improvements through the proceeds of short-term commercial paper sales and then redeems the commercial paper with the proceeds of long-term bonds. Interest rates on commercial paper and the variable rate debt of the Authority have been low in recent periods compared to historical conditions, resulting in actual interest costs that are lower than projections. There is no assurance that such market conditions will continue in future years. As a result, projections of future debt service payments assume that interest rates on commercial paper, variable rate debt, and future fixed rate debt will be higher than current market rates. At the time of this Report, the Authority had no commercial paper outstanding.

The debt service on Build America Bonds ("BABs") is net of the interest subsidy payments from the U.S. Treasury for those bonds. The BABs were issued on a taxable basis, and beginning in 2010, the U.S. Treasury has generally provided interest subsidy payments in each year equal to 32% to 35% of the interest payable. The figures shown for "Authority Debt Service – Second Resolution" (line 3) and "NYSEFC Outstanding Debt Service" (line 6) in Table 5C of this report reflect the application of the BABs subsidy payments so the debt service is net of such payments. At the time of this report, federal sequestration is continuing to reduce somewhat the actual payment of BABs subsidies by the federal government. It is not known at this time how long the sequestration will last, whether reductions in BABs payments will continue or whether any reductions will be made up through payments at a later date. A portion of the subsidy payment expected in 2020 was actually paid in 2021. The projected debt service in 2021 and subsequent years assumes that BABs subsidy payments reflect both: a) the effects of federal sequestration, and b) fewer bonds outstanding than in prior years.

Interest earnings on available funds (i.e., the Authority's Debt Service Fund, the Debt Service Reserve Fund, the Construction Fund, and the Subordinate Debt Service Fund), together with Authority expenses related to debt, collectively form either a net offset to a portion of the debt

service or a net addition. Interest earnings have generally been low in recent years due to conditions in the financial markets that have resulted in relatively low rates of interest earnings on secure investments. That factor plus increasing Authority expenses have resulted in a net addition to debt service in each year from 2015 through 2018, and the expectation that net additions will continue in each year from 2021 through 2025. In 2019 and 2020 there were net offsets to debt service due to greater interest earnings on available funds. Authority expenses related to debt include administrative expenses charged by NYSEFC for the low-interest loan program; liquidity fees, and other expenses related to variable rate debt; swap payments; arbitrage rebate payments; the cost of auditors, financial advisors and consultants; and other expenses.

4.2.2.3 Cash-Financed Construction and Cash Used for the Defeasance of Bonds

Portions of the capital improvements to the Water System may be financed through cash in lieu of the proceeds of Bonds; alternatively, such cash may also be used to defease outstanding bonds. The use of cash to either pay directly for construction or to defease debt is a common practice in the industry. No cash-financed construction deposits were made in 2010 through 2013 and in 2016 through 2017. In 2014, the Authority spent $225.0 million for cash-financed construction needs. In 2015, there was a release of $253.0 million from the debt service reserve fund of the Authority that was used for cash-financed construction[1]. This Report does not include any portion of the $253.0 million as a cost of water supply in 2015 nor does it include the amount in calculating the anticipated unit rate for that year because these capital dollars are already accounted for in the debt service of the Authority. In 2018 and 2019, the Authority spent $75.0 million and $54.6 million for cash-financed construction needs, respectively. In 2020, the Authority spent $60.0 million for cash-financed construction needs.

In 2011 through 2020, cash from the System was used to defease Authority Bonds by paying future debt service in advance of the years in which such debt service was payable. This was done to both reduce the System's debt burden and optimize future debt service payments by stabilizing annual changes to debt service. The amounts used for defeasance in recent years are summarized below.

- $299.99 million in 2013,
- $399.08 million in 2014,
- $802.67 million in 2015,
- $948.59 million in 2016,
- $991.95 million in 2017,
- $824.98 million in 2018,
- $675.36 million in 2019, and

[1] The Debt Service Reserve Fund for First Resolution Bonds must be at least equal to the maximum debt service on such Bonds in any future year. Following the refunding and defeasance of certain First Resolution Bonds the maximum debt service in a future year had declined from previous levels, thus allowing the release of a portion of the moneys in the Debt Service Reserve Fund.

- $350.00 million in 2020.

See Table 5D for the amounts used in each year and the computed water supply share.

Since all water supply customers share in the benefit of lower future debt service due to the defeasance, the costs of the defeasance are included in the cost of service just as the defeased debt service had previously been included, and these costs are apportioned to all water supply customers. While the use of moneys for defeasance may result in a short-term increase in the cost of service (depending upon when the benefits are realized), it produces long-term reductions in debt service that are greater than the costs incurred. The table below summarizes the actual (2011 through 2020) amounts for defeasance together with the reduction in total debt service expected to be achieved in each year based on actual results for the defeasances in 2011 through 2020 defeasance.

Debt Defeasance

Fiscal Year	Amounts Used For Defeasance ($)	Reduction in Debt Service ($)
2011	260,000,000	
2012	239,600,000	17,036,000
2013	299,990,000	44,835,000
2014	399,079,000	138,138,000
2015	802,671,000	243,044,000
2016	948,591,000	240,107,000
2017	991,951,000	296,881,000
2018	824,983,000	341,921,000
2019	675,356,000	353,262,000
2020	350,004,000	331,848,000
2021		626,063,000
2022		336,730,000
2023		247,064,000
2024		314,373,000
2025		234,184,000
	5,792,225,000	3,765,486,000
2026 and Beyond		4,961,892,000
Total	5,792,225,000	8,727,379,000

Note:
The debt service amounts above exclude the effects of economic defeasance of $200.0 million in 2016 and $195 million in 2017 while Amounts Used For Defeasance included these figures. The savings in future debt service payments would be greater than the amounts shown above if the effects of economic defeasance were included.
The figures above are rounded to the nearest thousand dollars.

The annual debt service figures shown in lines 1 and 3 of Table 5C are net of the debt service reductions shown in the table above. The benefits of economic defeasance are shown in line 8 of Table 5C; the annual savings in line 8 are applied to offset part of the Second Resolution Authority debt service in line 3 of Table 5C.

The annual revenue requirements for cash-financed construction and/or cash defeasance in future years are currently assumed to be:

- $600.0 million in 2021,
- $325.0 million in 2022, and
- $350.0 million in each year from 2023 to 2025.

The amounts projected for 2021 through 2025 are shown as annual deposits in the Cash Used for Capital Construction/Defeasance column in Table 5D. The projected amounts for each year may increase or decrease in the future, as the Board and the Authority may decide to modify the amount used for cash-financed capital contributions or the defeasance of outstanding bonds depending on financial results, market conditions, and forecasts. The water supply share of such costs in Table 5D is based on the total cash contribution in each year times the Water System capital costs as a percentage of total capital costs funded through the proceeds of both Authority Bonds and NYSEFC Bonds.

The projected debt service of the Authority that is used in Table 5C and in the calculation of the projected cost of water supply service reflects the actual impacts of the defeasance of debt that has taken place in prior years as well as the anticipated effects of the planned cash-financed construction deposits and defeasance in 2021. It is important to note that if the prior defeasance of debt had not taken place, debt service in each year for 2018 through 2025 would be higher than shown in this Report. The Authority's use of defeasance is an important part of its efforts to maintain strong credit ratings, which reduce the cost of borrowing for all debt to the benefit of all customers. The Authority's current credit ratings are shown below.

NYC Municipal Water Finance Authority Bond Ratings as of April 26, 2021

	First Resolution Bonds	Second Resolution Bonds
Standard & Poor's	AA+	AA+
Moody's Investors Service	Aa1	Aa1
Fitch Ratings	AA+	AA+

4.2.2.4 Ongoing and Future Capital Improvements

Ongoing capital improvements in the System to be funded through the proceeds of bonds in 2021 through 2025 include: rehabilitation of the Gilboa Dam; improvements to Ashokan Reservoir and related facilities; purchases of land; the Water for the Future Program; reconstruction or upgrading of other water supply infrastructure, filtration avoidance measures north of the City, and other projects and programs.

4.2.2.5 Capital Cost Summary

Favorable market conditions in 2018, 2019, 2020 and 2021 resulted in actual debt service on bonds issued and interest on variable rate debt and commercial paper that were lower than anticipated prior to the beginning of each year. Based on the year-to-date experience of the Authority in the financial markets, changes for 2021 have been taken into consideration in the

projected debt service for 2021 and subsequent years. There is no assurance that such conditions will continue in the future.

An overall net increase in debt service is projected in the upcoming years to reflect the debt service for capital improvements being funded through the proceeds of Authority bonds. Table 5C summarizes the historical and expected future annual costs attributable to debt service.

4.2.3 Judgments and Claims

Judgments and claims represent the amount of judgments rendered against the System or claims paid by the City for water supply-related matters in areas north of the City. Actual and projected judgments and claims are illustrated in Table 6. There are years in which no judgments or claims were paid for the Water System north of the City. Except for 2007 and 2019, payments made in other years have ranged from $3,695 in 2008 to $916,350 in 2011. A payment of about $5.5 million was made in 2007 to settle litigation relating to the Shandaken Tunnel. A payment of $1.0 million was made in 2019 as a result of the Hillview Consent Order. There may be additional expenses related to this matter. The payment amount in 2020 was $5,000. The cost of service analysis assumes that the fifteen-year (2006 through 2020) average of $610,156 will provide a reasonable allowance for judgments and claims in 2021 and in future years.

4.2.4 Miscellaneous Revenue

Miscellaneous revenues received from upstate sources are used to offset the total cost of supplying water to both in-City and upstate customers. As indicated in Table 7, miscellaneous revenues are derived from hydropower generated at upstate dams and from miscellaneous charges for permit use and related services provided in the Water System. In addition, miscellaneous revenues may include tax refunds when such refunds are made and when such refunds are not already reflected in the expense of real estate taxes paid. Miscellaneous revenues have been inconsistent over the years, declining in some years and increasing in others.

Hydropower revenues are shown for 2006 through 2020. Hydropower revenues in future years may differ from the historical experience. The City took ownership of the East Delaware (Grahamsville) and Neversink hydroelectric facilities in October 2006, which resulted in an overall increase in annual revenues (compared to historical experience) as well as increased costs for capital improvements and operation and maintenance expenses, including property taxes. The City also receives a relatively small amount of revenue from the operator of the West Delaware hydroelectric facility. No revenues are considered in the calculations for the Ashokan and Kensico facilities because no revenues are actually expected to be received by the City in 2021 or any future year.

With the exception of 2015, hydropower revenues as illustrated in Table 7 represent gross revenues prior to the application of offsetting expenses, and the offsetting expenses are included in the historical OTPS and personal services expenses shown in the tables of this report. The

2015 hydropower revenue is shown net of expenses; therefore, hydropower-related expenses are not included in the OTPS and personal services expenses calculations for 2015.

Table 14 shows the anticipated gross hydropower revenues by source. In 2021 and 2022, gross revenues are projected to be approximately $3.4 million and $3.5 million, respectively, which, together with other miscellaneous revenues, will be applied as a credit towards the cost of water supply service. With the construction of the Rondout-West Branch bypass tunnel noted in Section 1.3.2.1 beginning in October 2022 for a period of up to eight months, hydropower revenues will be impacted in 2023. Accordingly, projected 2023 hydropower revenues have been discounted by 50% to $1.8 million.

For purposes of estimating future miscellaneous revenues, the fifteen-year average (2006 through 2020) of permit/services revenues has been used. With the exception of 2009 and 2013, DEP has recently used tax refunds received to reduce real estate taxes, as shown in the $0 amount for tax refunds in 2005 through 2008, 2010 through 2012 and again in 2014 through 2020. In 2009 and 2013, DEP paid the tax bill in full prior to settlement, resulting in tax refunds of $248,145 and $209,232, respectively. At this time, the projections assume no refunds in future years. In lieu of tax refunds, DEP has advised that it may continue to apply credits against property taxes due in future years.

4.2.5 Personal Service Costs

Personal services expenses directly allocable to water supply services are shown in Tables 8A, 8B, 9A, and 9B. These expenses represent salary, pension, and fringe benefit costs associated with all BWS field personnel working in water supply facilities located north of the City as well as support and administrative personnel. Field personnel, for purposes of this report, are defined as DEP personnel with non-supervisory or non-management titles, working directly with the Water System. Thus, field personnel do not include personnel classified as management and/or administrative support. Irrespective of the "field" or "administrative support" designation, these costs are all entirely related to water supply. The methodology for classifying personnel between field personnel and support/administrative categories of cost is consistent with the City's indirect cost plan for federal and State grant programs. Prior indirect cost plans of the City that use this methodology have been approved by the federal government. Personal Services costs in Tables 8A, 8B, 9A, and 9B are categorized based on location. The categories can vary somewhat from previous year reports as locations have been consolidated or eliminated from a budgetary perspective. This does not necessarily indicate a physical change in location of the associated salaries.

Labor expenses for Hillview Reservoir include day-to-day operations, maintenance, and security. Security costs, in terms of both labor and non-labor expenses, have risen significantly in recent years as initiatives to protect the Water System have been implemented. Pension and fringe benefit rates that are applied to salaries and wages are expected to change in each year as summarized herein.

The source documents for the above referenced costs are DEP records, which identify salary and related costs by employee name and work location. Pension and fringe benefit factors reflect City-wide percentages of direct salary and wages. Pension and fringe benefit rates used in the Report, which are applied to salary and wage expenses, are summarized below. The rates for 2021 through 2025 are subject to change.

Pension/Fringe Benefit Rates (as a % of Salary & Wage $)

Year	Rate (%)
2018	50.11
2019	47.91
2020	48.01
2021-2025	47.54

The preceding pension and fringe benefit rates are applied to all projected labor costs related to the supply of water. The projected labor costs for 2021 through 2025 incorporate an assumed 3.0% per year increase from the 2020 base of personal salary and wage costs. The reconciliation of actual water supply costs and revenues in future reports will utilize the actual salaries and wages, as well as pension and fringe benefits of applicable personnel.

Approximately 95% of DEP's employees are members of labor unions which represent such employees in collective bargaining with the City. The majority of DEP employees who are members of unions are members of District Council 37 of the American Federation of State, County and Municipal Employees ("DC 37"). Those DEP employees who are not members of labor unions have generally received salary and benefit increases consistent with DC 37. An agreement with DC 37, covering the period from September 26, 2017 through May 25, 2021, was ratified on August 14, 2018. With the exception of union representing approximately 460 DEP employees, DEP has entered into settlement agreements which follow the DC 37 pattern with all unions representing DEP employees. DEP expects that the unsettled contracts will also follow the DC 37 pattern, except for the contract covering approximately 200 environmental police officers ("EPOs"), for which discussions are ongoing and which could result in terms that depart from the DC 37 pattern. The report uses a 3% annual increase in salaries and wages to cover both the assumed increases in salaries and wages as well as changes in overtime, staffing levels and other factors.

4.3 Calculation of Allocation Percentages - Step B

The remaining elements of the cost of service, i.e., those not directly or fully allocable to facilities north of the City, must undergo one or a series of allocations before an appropriate assignment of costs can be made. Accordingly, allocation percentages are developed for the purpose of apportioning a fair share of costs incurred by one bureau, unit, or location to the benefiting entity. For example, DEP incurs many costs in support of the Water System. The DEP cost burden must then be shared by the Water System through the use of an allocation percentage. The computation of the allocation percentages used in this report is based on data provided by DEP as presented in Table 10. The allocation factors presented in Table 10 specifically exclude employees working within the City in the wastewater system or the water distribution system in the numerator.

4.4 Allocation of Department of Environmental Protection Costs - Step C

Expenses of DEP that are covered by Step C represent personnel and other expenditures of DEP that are allocable to management, administration, and support services needed to operate and maintain the water supply facilities located north of the City. Again, City water distribution costs are specifically excluded.

Tables 11A and 11B illustrate allocated personal services costs, while Tables 12A and 12B present the allocation of a portion of DEP OTPS costs to facilities north of the City. Examples of the services provided include fleet administration, data processing, and personnel recruiting and management. The total costs to be allocated are multiplied by allocation percentages to obtain the costs for facilities located north of the City.

Allocated DEP personal services costs in 2021 through 2025 reflect the same assumptions identified in Section 4.2.5. OTPS costs are assumed to increase at an annual rate of 3.0%.

4.5 Allocation of City Central Service Costs - Step D

The City incurs costs that must be distributed among all of its operating entities. Such costs include planning, budgeting, accounting, purchasing, legal services, and other related activities. A cost allocation plan is developed to distribute the City-wide costs. The plan is approved by the federal government in connection with federal aid received by the City. After the City-wide allocation process, the DEP portion of the City's costs is divided further between non-utility and water and sewer utility components. The water and sewer utility-related costs are then distributed among the various DEP water and sewer functions using headcount allocation percentages. BWS is one of the functions to which costs are allocated. This cost is then further allocated to relate to facilities located north of the City. The allocated Central Service costs were $1,480,166 in 2020. Overall City support service costs to DEP are expected to be relatively stable in future years. Thus, such costs attributable to water supply are assumed to be $1,480,166 in 2021 and each year thereafter.

4.6 Cost of Service - Step E

The calculations of the total cost of water supply and the cost of water supply attributable to upstate customers are presented for 2018 through 2020 in Table 1A and for 2021 through 2025 in Table 1B. Additional tables are referenced to support the various categories of costs and offsetting revenues. These additional tables provide a detailed breakdown of the components of each step of the cost of service analysis.

The total cost of service (excluding reconciliations) is calculated to be $728,949,813 in 2019 and $727,320,266 in 2020. For 2019, with or without the reconciliation amounts from prior years, the revenues generated in that year are less than the cost of service. For 2020, with the reconciliation amounts from prior years, the revenues generated in that year are less than the cost of service.

The total cost of service (excluding reconciliations) is estimated to be $721,020,373 in 2021 and $735,266,464 in 2022. Of these amounts, $568,354,306 in 2021 and $577,987,246 in 2022, or about 79% in 2021 and in 2022 (excluding the effects of the reconciliation), is for debt service, defeasance/cash-financed construction, and direct out-of-pocket expenses (OTPS costs) associated with operating and maintaining the water supply facilities located north of the City. As illustrated in Table 4B, the largest item of OTPS expense for the supply of water is real estate taxes paid to upstate communities for watershed properties. Excluding the reconciliations, upstate taxes (included within OTPS expenses) will represent approximately 23% and 24% of all water supply costs in 2021 and in 2022, respectively.

Direct salary, pension costs, and fringe benefits for personnel directly and indirectly related to the water supply facilities located north of the City account for about another 20% of all costs, excluding the effects of the reconciliation, in 2021 and in 2022.

After accounting for the reconciliation, the net total cost of water supply as presented in Table 1B (line 19) is $787,096,537 for 2021 and $803,592,608 for 2022. The amount in 2021 includes the effects of the net charges of $6,652,370, $18,825,499, $18,831,804, and $21,766,491 that are added to the total cost of service for the 2016, 2017, 2018, and 2019 reconciliations, the recovery of which is spread over four years for each reconciliation. In 2022, the total includes the net charges of $18,825,499, $18,831,804, $21,766,491, and $8,902,350 that are added to the total cost of service for the 2017, 2018, 2019 and 2020 reconciliations.

The above charges reflect the effect of the four-year allocation or phase-in of the following reconciliations:

- $40,688,154 in 2014 (applied to the cost of service in 2016, 2017, 2018 & 2019);
- $43,598,241 in 2015 (applied to the cost of service in 2017, 2018, 2019 & 2020);
- $26,609,479 in 2016 (applied to the cost of service in 2018, 2019, 2020 & 2021);
- $75,301,994 in 2017 (applied to the cost of service in 2019, 2020, 2021 & 2022);
- $75,327,217 in 2018 (applied to the cost of service in 2020, 2021, 2022 & 2023);
- $87,065,964 in 2019 (applied to the cost of service in 2021, 2022, 2023 & 2024); and

- $35,609,402 in 2020 (applied to the cost of service in 2022, 2023, 2024 & 2025).

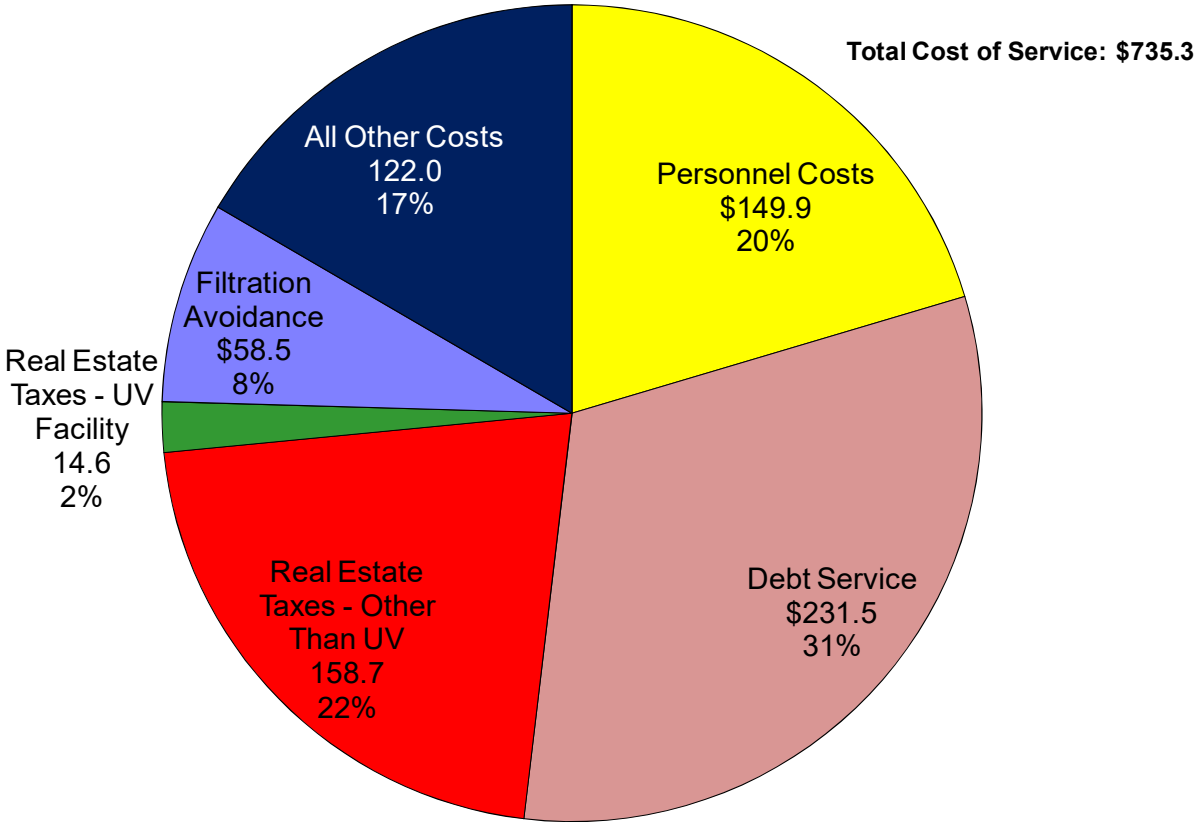
The four-year allocation or phase-in was recommended by Amawalk and adopted by the Board, at its discretion, to spread out the impact on the cost of service and rates.

The cost of water supply service as presented herein does not take into consideration the need to maintain an operation and maintenance reserve fund, to provide working capital to pay construction costs before being reimbursed through the proceeds of commercial paper, or to ensure liquidity in operating funds. If the costs of such needs were included, the cost of service and the regulated rate would be higher than is shown in this Report. The cost of service and the regulated rate also assume that all upstate customers pay their bills for water service on a timely basis, thus avoiding the need to include an allowance in the cost of service for late payments.

The chart below illustrates the breakdown of the total cost of service for the 2022 rate year excluding the effects of the reconciliation of prior year costs.

Figure 5 **Projected 2022 Cost of Service Components**

(all amounts in $ millions; totals may not add due to rounding)



4.7 Calculation of the Regulated Rate - Step F

Table 1A presents both a net cost of service (line 19) and an actual unit rate net of the reconciliation (line 21) for 2018 through 2020. Table 1B shows the projected net cost of service and a unit rate net of the reconciliation for 2021 through 2025.

The 2022 rate includes the effects of the reconciliation of costs for 2017, 2018, 2019, and 2020. The cost of service recovered in 2017, 2018, and 2019 (based on the adopted rate for each year and the actual quantity of water consumed) was less than the actual cost of service in each year; thus, the reconciled amount was identified and proposed to be recovered over a four year period. In a similar manner, a reconciliation of the 2020 projected and actual costs of service, consumption, and rates was prepared with the resulting shortfall in costs recovered through the rate being applied towards the cost of service for the upcoming rate year of 2022 and the following three years as discussed in Section 4.6.

Given the potential for variations in financing and commodities costs as well as changes in water consumption, this "true-up" approach is intended to ensure that both upstate and in-City customers pay their appropriate shares of the cost of water supply service.

Table 1B summarizes the calculation of the projected 2022 regulated rate required to recover the cost of service and the upstate cost of service using that rate. The regulated rate per MG of water use is computed by first calculating the total cost of service in line 13 and then dividing by the total water consumption shown on line 14. An excerpt from Table 1B is provided below to show the calculation of the rate.

Summary of the Calculation of the 2022 Unit Rate

13	Total Costs Related to Facilities North of the City	$	735,266,464
14	System Usage	MG	391,112
15	Unit Rate to Recover Total Costs (line 13 divided by 14)	$/MG	1,879.94
18d	Phasing of 2019 Reconciliation for FY 2017	$	18,825,499
18e	Phasing of 2020 Reconciliation for FY 2018	$	18,831,804
18f	Phasing of 2021 Reconciliation for FY 2019	$	21,766,491
18g	Phasing of 2022 Reconciliation for FY 2020	$	8,902,350
19	Net Total Costs for Facilities North of the City (line 13+18s)	$	803,592,608
21	Unit Rate Net of Reconciliation (line 19 / line 14)	$/MG	2,054.63
22	Upstate New York Usage	MG	34,764
23	Total Upstate Cost Including Reconciliation (line 21 x line 22)	$	71,426,350

After taking into account the reconciliation, the resulting unit rate, shown on line 21, is $2,054.63 per MG in 2022. The cost of service attributable to upstate customers (including the cost reconciliation) is calculated by multiplying the calculated unit rate of $2,054.63 by the projected annual upstate water consumption shown on line 22 of Table 1B. The resulting upstate cost is approximately $71.4 million for 2022. The remaining cost of water supply, approximately $732.2 million, will be recovered from in-City water customers through rates and charges. These figures assume that the calculated rate is in effect for the entire fiscal year.

Beginning with the report for the 2016 cost of service and rate, the reconciliation methodology uses a four-year allocation of the true-up amount instead of applying the full amount to the cost of service in the proposed rate year. For example, for the 2022 reconciliation, the use of the full 2020 shortfall of $35,609,402 instead of the $8,902,350 amount under the phased approach would have increased the cost of service by an additional $26,707,051 or $68.28 per MG.

A portion of the reconciliation from 2020 and the resulting total cost of service and regulated rate for 2022 is attributable to the cost of defeasance of debt. The use of defeasance produces substantial debt service savings, which reduces the cost of service in the current year and in future years for both upstate and in-City ratepayers as outlined previously. Defeasance produces

other substantial benefits as noted previously. It is noted that the total cost of service and regulated rate for 2022 is also impacted by the benefits of the projected defeasance of debt in 2022; in the absence of such benefits, the calculated total cost of service and regulated rate would be higher.

In recognition of the size of the reconciliation amounts, the calculations in this Report spread recovery of the reconciliation amount for these years over a four-year period so as to moderate the resulting increase (or decrease) in the regulated rate. The Board may consider whether or not to use this methodology in the reconciliation for the cost of service in any future year on a case-by-case basis. It is not recommended that a reconciliation period longer than four years be used since in-City ratepayers are essentially paying for the increased costs in the year in which such moneys are spent. The four-year maximum period recognizes the need to recover such costs promptly while avoiding overly substantial fluctuations in the unit rates for water supply from year to year. As illustrated in the subparts of line 18 in Table 1B, there is currently a significant amount of the previous cost of service to be recovered in future years through the phasing of reconciliations.

The water consumption used in calculating the regulated rate reflects a calculated decline in demand based on the results of a regression analysis. Water consumption data since 1985 is presented in Table 13. The use of the 10-year regression analysis was previously agreed-to by the City and representatives of upstate customers as a means to estimate future consumption. However, a 5-year regression analysis is used in this Report in estimating future water demand by both in-City and upstate customers. This is a change from previous reports which utilized a 10-year regression which produces a faster pace of decline than has been experienced in the City and upstate in recent years. The results of a 5-year regression analysis reflects more recent changes in annual consumption in-City and System-wide, which resulted in a more gradual decline for the calculated 2019 rate when the change was implemented as well as for the 2020 rate. The projected System-wide demand used to develop the projected unit rate for 2022, however, is slightly smaller using the 5-year regression compared to using the 10-year regression. The projected System-wide demand of 391,112 MG is used in developing the projected unit rate for 2022. By comparison, the use of the 10-year regression would have resulted in projected demand of 393,843 MG. The higher the projected System-wide consumption, the lower the projected unit rate.

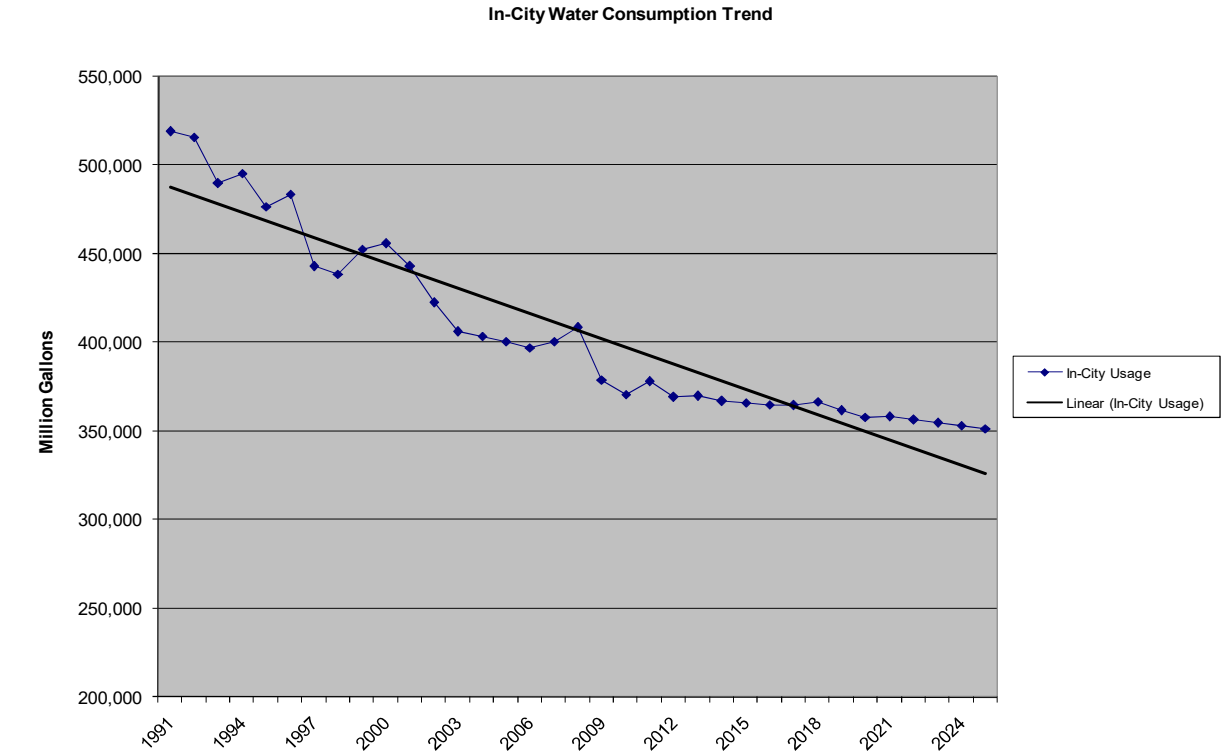
The results of the 5-year regression analysis provide an anticipated System-wide water consumption of 391,112 MG in 2022. The upstate share of total water consumption using the 5-year regression analysis is estimated to be 34,764 MG in 2022. In Figure 6, a line graph illustrates the projected consumption for both in-City and upstate customers.

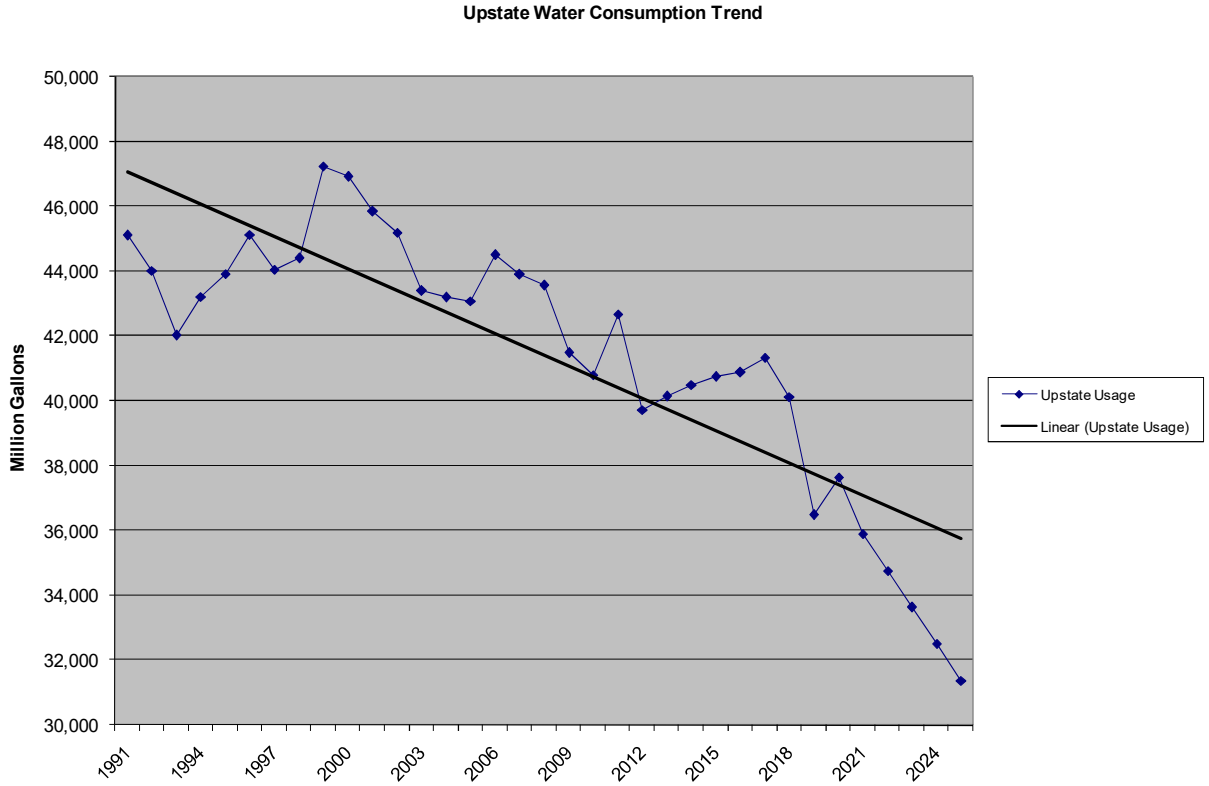
In 2018, consumption compared to the prior year increased slightly in-City and was 2.9% lower in upstate communities. Water consumption decreased 1.3% in 2019 versus the prior year in-City and decreased at a much greater pace of 9.1% in upstate communities. Water consumption decreased 1.0% in 2020 in-City and increased 3.2% in upstate communities.

Year-to-date consumption within the City through March 31, 2021 was about the same as consumption during the same period in 2020. Year-to-date consumption for upstate communities through February 28, 2021 was 0.6% higher than during the same period in 2020. COVID-19 will likely affect total System consumption in 2021 and 2022, which would impact the unit cost of service in those years. The actual impacts of COVID-19 on consumption may vary from the System-wide assumptions presented herein.

The regression results show an annual pace of System-wide decline that ranges from 0.4% in 2021 to 0.7% in 2022 through 2025. Current in-City assumptions utilize a 1.0% annual rate of decline in 2022 through 2025, independent of the effects of COVID-19, as well as assumed short-term, non-recurring declines in metered customer usage in 2021 through 2024.

Figure 6 Comparison of Water System Consumption





4.8 Additional Issues Relating to the Cost of Service and the Regulated Rate

There are other issues relevant to the Board's deliberations on the cost of service and regulated rate for 2021. Certain of these issues are summarized herein.

4.8.1 Operating Risks

The cost of service computations are presented on the cash basis methodology as required by NYSDEC. The cost of service analysis and regulated rate calculated for 2022 reflect no allowance for the risks being borne by the City as the owner and operator of the Water System. Other large water systems are permitted to earn a premium over the cost of service to provide an allowance for such risks.

4.8.2 Water Demand Management Initiatives

DEP has invested and continues to invest substantial amounts of money in water demand management initiatives, and such investments will help reduce the need to develop new supplies of water in the future and ensure that the Water System has sufficient capacity during the period when the Delaware Aqueduct is shut down for repairs. (See Sections 1.3.1.7, 1.3.2.1 and 1.4)

On May 4, 2012, the Board adopted a modified Multiple-family Conservation Program ("MCP"), pursuant to which the majority of the accounts that had been billed on the frontage basis were converted to charges that are based on a fixed rate per dwelling unit per year. Currently, approximately 24,100 accounts are billed on MCP. All accounts enrolled in the MCP were required to have meters, automatic meter reading ("AMR") devices, and high-efficiency plumbing fixtures installed, or by December 31, 2018 to have taken reasonable steps to comply with MCP requirements. Accounts which have failed to comply or take reasonable steps to comply with the MCP requirements by December 31, 2018 will be subject to an additional ten percent surcharge on their annual bill.

Since 2009, DEP has implemented an automated meter reading system that utilized New York City's wireless network. To date, DEP has installed approximately 829,800 automatic meter reading transmitters, representing 99% of DEP's installation target, and the automated meter reading system has been activated for those accounts that have had transmitters installed. All customers whose accounts have been upgraded for automated meter reading can view their daily water consumption via DEP's website; this consumption information is automatically updated at least four times per day. With the installation of automatic meter readers, DEP has seen a large decrease in estimated bills.

DEP is undertaking a Municipal Water Efficiency Program to retrofit fixtures and implement water reuse projects in City-owned facilities. Examples of other programs being used by DEP include the following:

- Sonar Leak Detection Program
- Meter Slippage Testing
- Hydrant Locking Devices
- Residential Water Survey Program

- School Water Conservation

The cost of service and regulated rate, as presented herein, do not include the costs of the funds invested in metering in-City customers or any of the other programs listed above even though such investments benefit the water supply for all users of the System.

North of the City, the Board provided demand management consulting services to analyze and make recommendations regarding water demand for the seven upstate customers that executed agreements with the Board. These customers are:

- Town of Greenburgh;
- Village of Ossining;
- Village of Scarsdale;
- Village of Tarrytown;
- Westchester Joint Water Works;
- City of White Plains; and
- City of Yonkers.

4.8.3 Upstate Wastewater Treatment Plants

In addition to non-City owned plants, the City owns and operates wastewater treatment plants in the watershed and is responsible for capital improvements in those facilities. Given the absence of a mechanism to recover the operating and capital costs of these facilities directly from the users of these systems, such costs are included within the cost of water supply service and the calculation of the regulated rate; thus assigning most of the costs to in-City customers.

4.8.4 COVID-19

The projected cost of water supply service and regulated rate for 2021 and 2022 as well as future years assumes that there will be a gradual recovery to the economy of the City and the region and that extraordinary water supply service costs associated with COVID-19 will be relatively nominal. Such assumptions are subject to change.

5.0 Impacts on Customers of the Calculated and Proposed Regulated Rate

The Fiscal Year 2020 and 2021 rate of $1,888.06 per MG represents a 9.2% increase over the regulated rate charged in Fiscal Years 2016, 2017, 2018 and 2019. The proposed regulated rate for 2022 is $2,054.63 per MG including the effects of the 2020 reconciliation spread over four years and if the rate were in effect for the entire fiscal year. Increasing the current regulated rate to the calculated rate for 2022 would represent an 8.82% increase for upstate customers. Since the regulated rate was not changed in 2021, the proposed increase represents an average annual change of 4.41% per year since the last rate-setting in 2020.

The impact on a typical single family homeowner of the proposed increase in the unit rate would be modest. The increase in charges attributable to a single family residence using 70,000 gallons of water per year would be $11.66 for the entire year, or 97 cents per month, or about three cents per day.

Prior to the effects of the reconciliation, the current estimate of the unit cost of service for 2021 is $1,830.29 per MG. After the effect of the reconciliation is taken into consideration, the preliminary calculated net unit cost of service for 2021 at the time of this report is $1,998.02 per MG which is higher than the rate in effect during 2021 of $1,888.06 per MG. The current estimate of the unit cost of service for 2021 will change based on actual costs incurred and will be reflected in a future report.

For 2023 through 2025, Figure 7 outlines the anticipated percentage change in the unit cost of water supply and the portions of the change attributable to increases or decreases in the cost of service and water consumption. The information presented in Figure 7 is preliminary and subject to change. If consumption declines at a pace that is faster than expected, the unit rate for water supply will increase in order to recover the estimated cost of service. As noted above, the unit cost of service in 2021 will likely be higher than the unit rate that was charged by the Board. If the final results for 2021 confirm this expectation, the percentage change in the unit rate due to the cost of service and the percentage change in the calculated unit rate for water supply in 2023 may increase from the amounts shown in Figure 7 due to the effects of the reconciliation for 2021.

Figure 7 Impact of Cost of Service and Consumption on Unit Rate

New York City Water Board
Cost of Supplying Water to Upstate Customers

	2023	*2024*	*2025*
Percentage Change in the Unit Rate due to Increase in Cost of Service (Net of Reconciliation)	7.6%	2.7%	1.1%
Percentage Change in the Unit Rate due to Fluctuations in Consumption	0.8%	0.8%	0.7%
Percentage Change in the Calculated Unit Rate for Water Supply (Net of Reconciliation)	8.4%	3.4%	1.8%

All figures are projected and totals may not add due to rounding.

The potential impact of the calculated regulated rate on the actual rate schedules for upstate customers will depend to a large extent on the upstate suppliers' cost of purchased water in relation to the total cost of service experienced by these suppliers. To illustrate the potential effects on the overall charges to customers, Tables 2A and 2B present the rate structures of several upstate communities that purchase water from the City. The annual single family residential water charge is computed for each community using a 70,000 gallon per year allowance. Table 3 illustrates the computed single family charge and shows the percentage increase in that charge that would occur with the proposed regulated rate for 2022.

Additional rate increases are anticipated in future years based on the need to protect the water supply for all customers and to avoid the costly possibility of having to filter Catskill and Delaware System water. Future changes in rates are dependent upon whether or not the overall declining trend in consumption continues as well as changes in debt service for capital improvements and the costs of watershed protection.

Prior to 2008, the rates and charges of the Board that were assessed to upstate customers for water supply service were generally less than the actual cost to the City. Table 15 illustrates the charges to upstate customers versus the computed cost to the City of serving those customers. The figures shown in Table 15 do not consider the effects of the reconciliation of the cost of service from prior years.

Appendices

Table 1A Historical Cost of Service

TABLE 1A
New York City Water Board
Cost of Supplying Water to Upstate Customers
Historical Cost of Service

No.	Description		FY 2018	FY 2019	FY 2020
	Bureau of Water Supply Direct				
	Costs for Facilities North of the City				
1	Other Than Personal Services	$	250,053,638	246,767,015	269,272,257
2	Debt Service	$	225,320,908	227,866,217	245,495,704
3a	Cash Used for Capital Construction	$	11,663,543	8,459,465	9,366,966
3b	Cash Used for the Defeasance of Debt	$	128,296,300	104,636,439	54,641,235
4	Judgment and Claims	$	9,781	1,024,049	5,000
5	Less Miscellaneous Revenue	$	(8,077,748)	(8,499,608)	(4,897,777)
	Personal Services				
6	Field Personnel	$	97,089,768	99,723,805	103,700,980
7	Support and Administrative Personnel	$	24,192,038	26,415,510	27,219,451
8	Total Costs Directly Related to Facilities North of the City	$	728,548,227	706,392,892	704,803,814
	Upstate Share of NYC DEP Costs				
9	Personal Services	$	9,586,411	10,095,352	10,842,044
10	Other Than Personal Services	$	10,658,251	10,822,209	10,194,242
11	Total NYC DEP Costs Allocated to Facilities North of the City	$	20,244,661	20,917,560	21,036,286
12	***Upstate Share of City Central Service Costs*** [(1)]	$	1,732,138	1,639,361	1,480,166
13	Total Costs Related to Facilities North of the City	$	750,525,026	728,949,813	727,320,266
14	System Usage	MG	406,551	398,171	395,602
15	***Unit Rate to Recover the Total Costs (line 13 divided by 14)***	$/MG	1,846.08	1,830.75	1,838.52
16	Unit Rate Charged	$	1,728.99	1,728.99	1,888.06
17	Revenue Raised (line 14 times 16)	$	702,921,778	688,433,316	746,920,097
		$			
18	Cost Reconciliation for Prior Years,	$			
18a	Phasing of 2016 Reconciliation for FY 2014		10,172,039	10,172,039	
18b	Phasing of 2017 Reconciliation for FY 2015		10,899,560	10,899,560	10,899,560
18c	Phasing of 2018 Reconciliation for FY 2016		6,652,370	6,652,370	6,652,370
18d	Phasing of 2019 Reconciliation for FY 2017			18,825,499	18,825,499
18e	Phasing of 2020 Reconciliation for FY 2018				18,831,804
19	Net Total Costs for Facilities North of the City (line 13+18)	$	778,248,995	775,499,280	782,529,499
20	Difference in Revenue Less Net Total Costs (line 17 minus 19)	$	(75,327,217)	(87,065,964)	(35,609,402)
21	***Unit Rate Net of Reconciliation (line 19 / line 14)***	$	1,914.27	1,947.65	1,978.07
22	Upstate New York Usage	MG	40,129	36,477	37,647
23	Total Upstate Cost Including Reconciliation (line 21 x line 22)	$	76,816,968	71,044,200	74,468,298

Notes:
(1) Based on factors allocating a portion of central city service costs.
(2) Starting with FY 2016 rates, cost reconciliations for prior years are spread over a four-year period.

Table 1B Cost of Service Projections

TABLE 1B
New York City Water Board
Cost of Supplying Water to Upstate Customers
Cost of Service Projections

Line No.	Description		FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
	Bureau of Water Supply Direct						
	Costs for Facilities North of the City						
1	Other Than Personal Services	$	288,420,693	295,919,377	323,644,883	311,580,487	319,731,950
2	Debt Service	$	186,263,955	231,522,024	262,771,753	313,663,076	331,709,433
3	Cash Used for Capital Construction or Debt Defeasance	$	93,669,657	50,545,845	54,433,987	54,433,987	54,433,987
4	Judgment and Claims	$	610,156	610,156	610,156	610,156	610,156
5	Less Miscellaneous Revenue	$	(5,472,030)	(5,540,313)	(3,833,920)	(5,681,004)	(5,753,466)
	Personal Services						
6	Field Personnel	$	106,472,832	109,667,017	112,957,027	116,345,738	119,836,110
7	Support and Administrative Personnel	$	27,947,007	28,785,417	29,648,979	30,538,449	31,454,602
8	Total Costs Directly Related to Facilities North of the City	$	697,912,270	711,509,523	780,232,866	821,490,888	852,022,772
	Upstate Share of NYC DEP Costs						
9	Personal Services	$	11,131,844	11,465,799	11,809,773	12,164,067	12,528,988
10	Other Than Personal Services	$	10,496,093	10,810,976	11,135,305	11,469,364	11,813,445
11	Total NYC DEP Costs Allocated to Facilities North of the	$	21,627,937	22,276,775	22,945,078	23,633,431	24,342,434
12	***Upstate Share of City Central Service Costs***	$	1,480,166	1,480,166	1,480,166	1,480,166	1,480,166
13	Total Costs Related to Facilities North of the City	$	721,020,373	735,266,464	804,658,111	846,604,485	877,845,372
14	System Usage	MG	393,938	391,112	388,286	385,460	382,634
15	***Unit Rate to Recover Total Costs (line 13 divided by 14)***	$/MG	1,830.29	1,879.94	2,072.33	2,196.35	2,294.22
16	Unit Rate Charged	$/MG	1,888.06				
17	Revenue Raised (line 14 times 16)	$	743,779,110				
18c	Phasing of 2018 Reconciliation for FY 2016	$	6,652,370				
18d	Phasing of 2019 Reconciliation for FY 2017		18,825,499	18,825,499			
18e	Phasing of 2020 Reconciliation for FY 2018		18,831,804	18,831,804	18,831,804		
18f	Phasing of 2021 Reconciliation for FY 2019		21,766,491	21,766,491	21,766,491	21,766,491	
18g	Phasing of 2022 Reconciliation for FY 2020			8,902,350	8,902,350	8,902,350	8,902,350
18h	Phasing of 2023 Reconciliation for FY 2021 (Preliminary)				10,829,357	10,829,357	10,829,357
19	Net Total Costs for Facilities North of the City (line 13+18s)	$	787,096,537	803,592,608	864,988,113	888,102,683	897,577,079
20	Difference in Revenue Less Net Total Costs (line 17 minus 19)	$	(43,317,427)	N/A	N/A	N/A	N/A
21	***Unit Rate Net of Reconciliation (line 19 / line 14)***	$/MG	1,998.02	2,054.63	2,227.71	2,304.01	2,345.78
22	Upstate New York Usage	MG	35,896	34,764	33,631	32,498	31,365
23	Total Upstate Cost Including Reconciliation (line 21 x line 22)	$	71,721,444	71,426,350	74,919,608	74,875,792	73,576,359

Table 2A Current Water Rates for Upstate New York Communities

TABLE 2A
New York City Water Board
Cost of Supplying Water to Upstate Customers
Current Water Rates for Upstate New York Communities

	City of White Plains	Village of Scarsdale
Current Water Rates	$2.77/Ccf - 1st 50 Ccf $3.09/Ccf - Next 100 Ccf (Rates are semi-annual; additional blocks for greater consumption) Plus fixed charge of $38.85 for residential meters 1" or less, per 6 mths	$3.50/Ccf - 1st 50 Ccf (qtrly accts); 3.0 X Base Rate for Excess Rate Tier One (51-125 Ccf 3.5 X Base Rate for Excess Rate Tier Two (>125 Ccf) Plus service charge based on meter size: $12.00/qtr for 5/8"; $18.00/qtr for 3/4"; etc.
Avg. Annual Residential Use (Gal.)	70,000	70,000
Avg. Annual Residential Use (Ccf)	93.58	93.58
Avg. Residential Water Bill	$337	$388

	Village of Mamaroneck	Town of Harrison
Current Water Rates	$5.07/Ccf - 1st 22 Ccf per Mth $5.88/Ccf - Next 50 Ccf per Mth Plus service charge based on meter size: $9.70/mth for 5/8"; $11.57/mth for 3/4"; etc.	$4.45/Ccf - 1st 22 Ccf per Mth $5.36/Ccf - Next 50 Ccf per Mth Plus service charge based on meter size: $14.20/mth for 5/8"; $15.46/mth for 3/4"; etc.
Avg. Annual Residential Use (Gal.)	70,000	70,000
Avg. Annual Residential Use (Ccf)	93.58	93.58
Avg. Residential Water Bill	$602	$594

	New Rochelle Suez Water Westchester	City of Mount Vernon
Current Water Rates	Consumption charge: $3.8181 / Ccf for the First 5 Ccf/mth Cost of Water Charge: $2.4292 / Ccf Plus Facility Charge based on meter size: $13.30/mth for 5/8"; $19.40/mth for 3/4"; etc. Plus Public Fire Hydrant Charge: $6.93/mth for 5/8"; $10.84/mth for 3/4"; etc.	$3.64/Ccf - per quarter
Avg. Annual Residential Use (Gal.)	70,000	70,000
Avg. Annual Residential Use (Ccf)	93.58	93.58
Avg. Residential Water Bill	$887	$341

Notes:
The above rates and charges reflect the rate schedules of each community in April 2021.
Calculated average residential water bill excludes taxes and surcharges, if any.

Table 2B Current Water Rates for Upstate New York Communities

TABLE 2B
New York City Water Board
Cost of Supplying Water to Upstate Customers
Current Water Rates for Upstate New York Communities

	Town of Carmel	City of Yonkers
Current Water Rates	$63.80 per 1,000 cf (Water District #1) $34.50 per 1,000 cf (Water District #2)	$126.58/6 mths for up to 25 Cc for both water and sewer; $4.04 / Ccf for usage > 25 Ccf
Avg. Annual Residential Use (Gal.)	70,000	70,000
Avg. Annual Residential Use (Ccf)	93.58	93.58
Avg. Residential Water Bill	$323 - $597	$379

	City of Newburgh	Village of Cornwall
Current Water Rates	$7.43 per 1,000 Gal over Minimum Water Facility Fee of $7.34 Per Quarter Minimum charge based on meter size: $44.58/qtr for 5/8" Minimum Charge up to 6,000 gals $104.02/qtr for 3/4" Minimum Charge up to 14,000 gals	$12.00 per 1,000 Gal
Avg. Annual Residential Use (Gal.)	70,000	70,000
Avg. Annual Residential Use (Ccf)	93.58	93.58
Avg. Residential Water Bill	$549	$840

Notes:
The above rates and charges reflect the rate schedules of each community in April 2021.
Calculated average residential water bill excludes taxes and surcharges, if any.

Table 3 Summary of Impacts on Upstate Customers

TABLE 3
New York City Water Board
Cost of Supplying Water to Upstate Customers
Summary of Impacts on Upstate Customers

Water System Customer	Typical Single Family Charges	Increase Attributable to Proposed 2022 Regulated Rate	% Change to a Homeowner
City of White Plains	$337	$11.66	3.5%
Village of Scarsdale	$388	$11.66	3.0%
City of New Rochelle	$887	$11.66	1.3%
City of Yonkers	$379	$11.66	3.1%
Village of Mamaroneck	$602	$11.66	1.9%
Town of Harrison	$594	$11.66	2.0%
City of Mount Vernon	$341	$11.66	3.4%
Town of Carmel	$323 - $597	$11.66	2.0% to 3.6%
City of Newburgh	$549	$11.66	2.1%
Village of Cornwall	$840	$11.66	1.4%
New York City	$373	$11.66	3.1%

Notes:
(1) The Typical Single Family Charge for selected communities is based on 70,000 gallons of annual water use and the rate schedules of each community in April 2021.
(2) The proposed increase in annual water charges for New York City in FY 2022 to the New York City Water Board is 2.76%. The change within the City reflects increases in the cost of water supply and increases in water costs within the City.

Table 4A Historical Upstate Other Than Personal Services Costs

TABLE 4A
New York City Water Board
Historical Cost of Supplying Water to Upstate Customers
Upstate New York Other Than Personal Services Costs

Line No.	Description	FY 2018 $	FY 2019 $	FY 2020 $
	Budget			
1	Supplies and Materials - General	3,952,639	4,894,308	3,822,709
2	Automotive Supplies and Materials	423,282	552,325	597,573
3	Fuel Oil	2,191,287	1,996,254	1,675,632
4	Equipment - General	1,369,538	1,399,529	1,310,100
5	Telecommunications Equipment	53,343	148,042	180,148
6	Office Equipment	151,420	570,958	85,924
7	Contractual Services - General	6,192,029	5,560,331	7,307,001
8	Telephone and Other Communications	265,245	255,759	236,963
9	Office Services	160,475	160,122	159,842
10	Maintenance and Repairs - Motor Vehicles	293,508	504,283	307,213
11	Maintenance and Repairs - General	1,541,734	1,858,875	1,465,790
12	Rentals - Miscellaneous Equipment	2,760,656	2,802,439	3,327,392
13	Advertising	113,065	180,917	93,519
14	Cleaning Services	684,362	1,231,335	798,848
15	Licenses (1)	0	0	0
16	Chemicals	2,106,988	1,996,333	2,020,930
17	Real Estate Taxes - Existing Properties	147,459,939	149,611,114	151,077,059
18	Real Estate Taxes - UV Facility	15,506,526	15,530,981	14,824,942
19	NYS DEC Permits (1)	0	0	0
20	Motor Maintenance Supplies	1,270,885	315,048	640,882
21	Gasoline (1)	0	0	0
22	Lab and Limnology	97,661	154,359	500,874
23	Natural Gas & Electricity (2) (3)	5,878,983	1,495,950	1,261,995
24	Heat, Light & Power (2)	2,077,316	1,500,871	1,950,131
25	Upstate Cost of Service/Rate Studies	136,401	130,421	148,408
26	Hillview Reservoir	11,947,626	12,320,931	10,570,141
27	UV Facility (2)	3,205,233	2,723,844	8,726,758
28	Filtration Avoidance - O&M Payments	12,438,094	12,844,111	12,788,572
29	Filtration Avoidance - Program Funding	26,299,380	23,826,561	42,381,537
30	New Facilities (4)	0	0	0
31	Water for the Future (5)	55,817	291,554	111,634
32	Water Supply Environmental Health & Safety	1,420,207	1,909,458	899,741
33	Totals	250,053,638	246,767,015	269,272,257

Notes:

(1) Actual costs were not available at the publishing of this report. The City reserves the right to include such expenses in calculating the cost of service and regulated rate at a future date.

(2) Natural Gas & Electricity costs were centralized until FY 2013. Starting in FY 2014, electricity costs for the UV facility and Water Supply Heat, Light & Power were separately tracked.

(3) Beginning in FY 2019, line 23 for electricity and gas excludes costs associated with the Croton Filtration Plant and Jerome Park within the limits of the City recognizing that such facilities are an integral part of the water supply system.

(4) New facilities include a new Catskill Chlorination Facility located in Ulster County and a new chlorine dioxide facility at the Croto Gatehouse.

(5) Water for the Future program includes expenses affiliated with the Wholesale Customers Program in regards to water conservation assistance and expenses related to the Delaware Aqueduct shutdown.

Table 4B Projected Upstate Other Than Personal Services Costs

TABLE 4B
New York City Water Board
Projected Cost of Supplying Water to Upstate Customers
Upstate New York Other Than Personal Services Costs

Line No.	Description	*Projected Years* FY 2021 $	FY 2022 $	FY 2023 $	FY 2024 $	FY 2025 $
1	Supplies and Materials - General	3,937,390	4,055,511	4,177,177	4,302,492	4,431,567
2	Automotive Supplies and Materials	615,500	633,965	652,984	672,573	692,751
3	Fuel Oil	1,725,901	1,777,678	1,831,008	1,885,938	1,942,516
4	Equipment - General	1,349,403	1,389,885	1,431,582	1,474,529	1,518,765
5	Telecommunications Equipment	185,552	191,119	196,852	202,758	208,841
6	Office Equipment	88,502	91,157	93,891	96,708	99,609
7	Contractual Services - General	7,526,211	7,751,997	7,984,557	8,224,094	8,470,817
8	Telephone and Other Communications	244,072	251,394	258,936	266,704	274,705
9	Office Services	164,637	169,577	174,664	179,904	185,301
10	Maintenance and Repairs - Motor Vehicles	316,430	325,922	335,700	345,771	356,144
11	Maintenance and Repairs - General	1,509,764	1,555,056	1,601,708	1,649,759	1,699,252
12	Rentals - Miscellaneous Equipment	3,427,214	3,530,030	3,635,931	3,745,009	3,857,359
13	Advertising	96,325	99,215	102,191	105,257	108,415
14	Cleaning Services	822,814	847,498	872,923	899,111	926,084
15	Licenses (1)	0	0	0	0	0
16	Chemicals	2,081,558	2,144,004	2,208,324	2,274,574	2,342,811
17	Real Estate Taxes - Existing Properties	154,853,986	158,725,335	162,693,469	166,760,805	170,929,826
18	Real Estate Taxes - UV Facility	14,256,829	14,613,250	14,978,581	15,353,045	15,736,872
19	NYS DEC Permits (1)	0	0	0	0	0
20	Motor Maintenance Supplies	660,109	679,912	700,310	721,319	742,958
21	Gasoline (1)	0	0	0	0	0
22	Lab and Limnology	515,900	531,377	547,318	563,738	580,650
23	Natural Gas & Electricity	1,299,855	1,338,851	1,379,016	1,420,387	1,462,998
24	Heat, Light & Power	2,008,635	2,068,894	2,130,961	2,194,890	2,260,736
25	Upstate Cost of Service/Rate Studies	100,000	80,000	82,400	84,872	87,418
26	Hillview Reservoir	10,887,245	11,213,862	11,550,278	11,896,786	12,253,690
27	UV Facility	12,482,167	12,856,632	13,242,331	13,639,601	14,048,789
28	Filtration Avoidance - O&M Payments	13,172,229	13,567,396	13,974,418	14,393,651	14,825,460
29	Filtration Avoidance - Program Funding	43,652,983	44,962,573	46,311,450	47,700,794	49,131,817
30	New Facilities (2)	9,512,752	9,512,752	9,512,752	9,512,752	9,512,752
31	Water for the Future (3)	0	0	20,000,000	0	0
32	Water Supply Environmental Health & Safety	926,733	954,535	983,171	1,012,666	1,043,046
33	Totals	288,420,693	295,919,377	323,644,883	311,580,487	319,731,950

Notes:

(1) Actual costs were not available at the publishing of this report. The City reserves the right to include such expenses at a future date.

(2) New facilities include a new Catskill Chlorination Facility located in Ulster County and a new chlorine dioxide facility at the Croton Lake Gatehouse.

(3) Water for the Future program includes expenses affiliated with the Wholesale Customers Program in regards to water conservation assistance and expenses related to the Delaware Aqueduct shutdown.

Table 5A Authority Bond Proceeds

Table 5A
New York City Water Board
Cost of Supplying Water to Upstate Customers
Proceeds of Authority Bonds Used for Upstate Projects

Line	Bond Issue	Total Principal ($)	Total Upstate Allocation	Upstate Principal ($)
1	1986 through 2014	27,292,482,298	16.33%	4,457,302,623
2	FY 2014 Series AA	650,870,000	26.13%	170,095,641
3	FY 2014 Series BB	397,085,000	13.09%	51,984,538
4	FY 2014 Series CC	351,240,000	20.91%	73,429,272
5	**2015 Total**	28,691,677,298	16.57%	4,752,812,075
6	FY 2015 Series AA	200,000,000	21.12%	42,249,215
7	FY 2015 Series BB	400,000,000	19.03%	76,115,880
8	FY 2015 Series CC	200,000,000	9.64%	19,281,713
9	FY 2015 Series EE	136,135,000	25.94%	35,317,950
10	**2016 Total**	29,627,812,298	16.63%	4,925,776,833
11	FY 2016 AA-1, AA-2, AA-3	250,000,000	13.28%	33,193,059
12	FY 2016 BB	328,030,000	17.52%	57,466,192
13	**2017 Total**	30,205,842,298	16.61%	5,016,436,084
14	FY 2017 Series AA	201,000,000	17.28%	34,739,463
15	FY 2017 Series BB	289,500,000	18.47%	53,471,437
16	FY 2017 Series CC	327,310,000	14.11%	46,194,454
17	FY 2017 Series DD	336,540,000	16.68%	56,150,220
18	**2018 Total**	31,360,192,298	16.60%	5,206,991,657
19	FY 2018 Series BB	219,555,000	15.17%	33,308,623
20	FY 2018 Series CC	338,960,000	11.70%	39,673,692
21	FY 2018 Series DD	275,000,000	19.16%	52,677,550
22	**2019 Total**	32,193,707,298	16.56%	5,332,651,522
23	FY 2019 Series BB	100,000,000	2.24%	2,240,277
24	FY 2019 Series CC	300,000,000	30.20%	90,608,571
25	FY 2019 Series DD	475,000,001	9.19%	43,668,138
26	FY 2019 Series FF	110,185,000	28.18%	31,053,799
27	**2020 Total**	33,178,892,299	16.58%	5,500,222,308
28	FY 2020 Series BB	450,000,000	22.25%	100,124,972
29	FY 2020 Series CC	376,285,000	15.62%	58,783,070
30	FY 2020 Series DD	386,955,000	14.68%	56,807,590
31	FY 2020 Series GG	439,115,000	17.20%	75,509,103
32	**2021 Total**	34,831,247,299	16.63%	5,791,447,043
33	FY 2021 Series AA	279,860,000	22.55%	63,098,317
34	FY 2021 Series BB	356,323,844	1.28%	4,558,072
		35,467,431,143	16.52%	5,859,103,432
20	**2022-2025 Total**		16.57%	

Notes:
(A) The 1991 C Bonds were not included in the calculations used in the report. The total principal was $4,650,000.
(B) Figures for recent bond issues are preliminary; the upstate portion may change after all bond proceeds are spent.

Table 5B NYSEFC Bond Proceeds

Table 5B
New York City Water Board
Cost of Supplying Water to Upstate Customers
Proceeds of NYSEFC Bonds Used for Upstate Projects

Line No.	Bond Issue	Total Principal ($)	Upstate Allocation	Upstate Principal ($)
1	1986 through 2007	5,229,488,675	5.61%	293,549,848
2	FY 2008 Series 1,2	399,690,401	19.01%	75,989,525
3	**2009 Total**	5,629,179,076	6.56%	369,539,373
4	FY 2009 Series 1,2	448,435,268	27.23%	122,116,226
5	**2010 Total**	6,077,614,344	8.09%	491,655,599
6	FY 2010 Series 2,3,4	406,684,607	26.75%	108,800,028
7	**2011 Total**	6,484,298,951	9.26%	600,455,626
8	FY 2011 Series 1	478,881,733	18.80%	90,032,698
9	**2012-2014 Total**	6,963,180,684	9.92%	690,488,324
10	FY 2014 Series 2	209,380,000	16.20%	33,914,464
11	**2015 Total**	7,172,560,684	10.10%	724,402,788
12	FY 2016 Series 1,2	302,210,000	27.17%	82,100,990
13	FY 2016 Series 5,6	562,965,000	20.92%	117,781,965
14	**2017 Total**	8,037,735,684	11.50%	924,285,743
15	FY 2017 Series 3,4	569,448,000	14.79%	84,205,418
16	**2018 Total**	8,607,183,684	11.72%	1,008,491,161
17	FY 2018 Series 1,2	669,436,000	12.56%	84,073,070
18	**2019 Total**	9,276,619,684	11.78%	1,092,564,231
19	FY 2019 Series 1,2	485,144,000	22.87%	110,940,996
20	**2020 Total**	9,761,763,684	12.33%	1,203,505,227
21	FY 2020 Series 2,4	161,250,000	17.79%	28,688,552
22	FY 2020 Series 5,7	263,471,000	10.86%	28,604,684
23	**2021 Total**	10,186,484,684	12.38%	1,260,798,464
22	**2022-2025 Total**		12.05%	

Notes:
(A) Figures for recent bond issues are preliminary; the upstate portion may change after all bond proceeds are spent.

Table 5C Debt Service

Table 5C
New York City Water Board
Cost of Supplying Water to Upstate Customers
Debt Service

Line No.	Description		*Actual* FY 2018 $	FY 2019 $	FY 2020 $	FY 2021 $	FY 2022 $	*Projected* FY 2023 $	FY 2024 $	FY 2025 $
	System Totals - Capital-Related Costs									
1	Authority Debt Service - First Resolution (A.)	A	59,267,073	77,020,454	104,895,507	11,972,743	28,657,301	32,123,726	37,323,363	37,323,363
2	Anticipated Debt Service - First Resolution	B	-	-	-	-	-	-	-	-
3	Authority Debt Service - Second Resolution (A.)	C	986,386,515	992,876,405	1,043,339,760	920,258,994	1,223,406,034	1,295,222,784	1,355,288,601	1,321,312,343
4	Anticipated Debt Service - Second Resolution	D	-	-	-	-	26,746,250	91,428,700	170,339,027	266,369,626
5	Interest on Short-Term Debt	E	-	-	-	-	-	17,000,000	17,000,000	17,000,000
6	NYS EFC Outstanding Debt Service	F	439,183,737	454,687,792	458,211,635	359,887,584	447,110,986	440,818,857	409,081,063	406,142,599
7	NYS EFC Projected Debt Service	G	-	-	-	-	6,457,460	26,663,683	42,286,894	58,267,872
8	Less: Cash Released from Escrow (B.)	H			-	(118,390,250)	(315,279,250)	(287,174,250)	(47,145,000)	-
	System Totals - Interest Earnings & Expenses									
9	Debt Service Fund	I	(7,990,618)	(26,845,034)	(17,210,030)	-	-	-	(83,610)	(125,410)
10	Debt Service Reserve Fund	J	(20,168,263)	(18,911,353)	(14,978,872)	(24,395,240)	(15,100,000)	(14,200,000)	(12,900,000)	(8,700,000)
11	Construction Fund	K	(7,245,303)	(7,621,469)	(7,912,608)	(150,000)	(300,000)	(750,000)	(1,500,000)	(2,250,000)
12	Subordinated Debt Service Fund	L	-	-	-	(262,430)	(1,066,770)	(2,869,450)	(5,935,230)	(9,177,290)
13	Miscellaneous Income & Expenses	M	(13,994,367)	(10,369,356)	(14,405,409)	(14,405,409)	(14,405,409)	(14,405,409)	(14,405,409)	(14,405,409)
14	Less: Authority Debt-Related Expenses	N	52,464,728	47,865,374	47,580,768	52,997,250	50,606,013	54,184,295	56,893,510	59,738,185
	Water Supply - Capital-Related Costs									
15	Authority Debt Service - First Resolution (A.)	A x O	9,840,601	12,757,873	17,389,026	1,984,778	4,748,764	5,323,181	6,184,806	6,184,806
16	Anticipated Debt Service - First Resolution	B x O	-	-	-	-	-	-	-	-
17	Authority Debt Service - Second Resolution (A.)	C x O	163,777,897	164,462,695	172,959,379	152,555,697	202,729,029	214,629,689	224,583,118	218,952,956
18	Anticipated Debt Service - Second Resolution	D x O	-	-	-	-	4,432,086	15,150,531	28,226,659	44,139,766
19	Interest on Short-Term Debt	E x P	-	-	-	-	-	2,643,936	2,643,936	2,643,936
20	NYS EFC Debt Service	(F+G)xQ	51,458,518	53,551,362	56,491,851	44,369,706	54,669,466	56,346,558	54,404,237	55,976,276
21	Less: Cash Released from Escrow (B.)	H x Q			-	(14,596,060)	(38,001,207)	(34,613,658)	(5,682,476)	-
	Water Supply - Interest Earnings									
22	Debt Service Fund	I x O	(1,326,748)	(4,446,683)	(2,852,988)	-	-	-	(13,855)	(20,782)
23	Debt Service Reserve Fund	J x O	(3,348,703)	(3,132,527)	(2,483,119)	(4,044,115)	(2,502,201)	(2,353,064)	(2,137,642)	(1,441,666)
24	Construction Fund	K x P	(1,126,745)	(1,180,834)	(1,235,286)	(23,417)	(46,658)	(116,644)	(233,289)	(349,933)
25	Subordinated Debt Service Fund	LxOxQ	-	-	-	(40,370)	(163,943)	(442,809)	(922,301)	(1,426,928)
26	Miscellaneous Income & Expenses	MxOxQ	(2,112,907)	(1,561,703)	(2,201,282)	(2,215,989)	(2,213,847)	(2,223,018)	(2,238,520)	(2,239,821)
27	Less: Authority Debt-Related Expenses	N x P	8,158,995	7,416,034	7,428,124	8,273,724	7,870,534	8,427,049	8,848,402	9,290,822
28	Net Water Supply Debt Service		225,320,908	227,866,217	245,495,704	186,263,955	231,522,024	262,771,753	313,663,076	331,709,433
			FY 2018	**FY 2019**	**FY 2020**	**FY 2021(C.)**	**FY 2022-25(D.)**			
29	Upstate Authority $ as a % of Total Authority CI	O	16.60%	16.56%	16.58%	16.58%	16.57%			
30	Upstate Total CIP $ as a % of Total CIP $	P	15.55%	15.49%	15.61%	15.61%	15.55%			
31	Upstate NYS EFC $ as a % of Total NYS EFC C	Q	11.72%	11.78%	12.33%	12.33%	12.05%			

(A.) Includes the estimated effects of the proposed FY 2021 defeasance/cash-financed construction in FY 2022 through FY 2025.
(B.) Starting with 2021, cash released from escrow is broken out from Line No. 6 NYS EFC Outstanding Debt Service to highlight offset to debt service. Prior to 2021, this offset is included in Line No. 6 Cash released from escrow may instead be used to legally defease Authority or NYS EFC debt in the year shown.
(C.) Uses the same percentages as for 2020 since not all proceeds of 2021 bonds were spent as of the date of this report
(D.) Uses the average of the percentages applicable to 2019 and 2020

Table 5D Cash Used for Construction and the Defeasance of Debt

TABLE 5D
New York City Water Board
Cost of Supplying Water to Upstate Customers
Cash Used for Capital Construction and the Defeasance of Debt
All Amounts in $

	Cash Used for Capital Construction/ Defeasance	Cash Used for Capital Construction	Cash Used for the Defeasance of Debt	Upstate CIP as a % of Water/Sewer CIP (1)
FY 2018	899,982,803	75,000,000	824,982,803	15.55%
FY 2019	729,955,897	54,600,000	675,355,897	15.49%
FY 2020	410,003,855	60,000,000	350,003,855	15.61%
FY 2021	600,000,000	N/A	N/A	15.61%
FY 2022	325,000,000	N/A	N/A	15.55%
FY 2023	350,000,000	N/A	N/A	15.55%
FY 2024	350,000,000	N/A	N/A	15.55%
FY 2025	350,000,000	N/A	N/A	15.55%

	Upstate Portion of Cash Used for Capital Construction/ Defeasance	Upstate Portion of Cash Used for Capital Construction	Upstate Portion of Cash Used for the Defeasance of Debt
FY 2018	139,959,843	11,663,543	128,296,300
FY 2019	113,095,904	8,459,465	104,636,439
FY 2020	64,008,201	9,366,966	54,641,235
FY 2021	93,669,657	N/A	N/A
FY 2022	50,545,845	N/A	N/A
FY 2023	54,433,987	N/A	N/A
FY 2024	54,433,987	N/A	N/A
FY 2025	54,433,987		

(1) Upstate CIP % is from Table 5C for FY 2018 - FY 2025.
(2) The amounts shown for FY 2021 through FY 2025 are preliminary and subject to change.

TABLE 6
New York City Water Board
Cost of Supplying Water to Upstate Customers
Judgments and Claims

Year	Historical Costs ($)
2006	0
2007	5,513,361
2008	3,695
2009	26,925
2010	668,221
2011	916,350
2012	240,320
2013	526,166
2014	42,626
2015	126,319
2016	44,517
2017	5,015
2018	9,781
2019	1,024,049
2020	5,000
Average (2006-2020)	610,156
Projection Years (2021-2025)	610,156

Note:
The City reached a settlement for the Hillview cover consent order and agreed to pay the Federal Department of Justice a $1 million civil penal This amount was paid directly by the Comptroller's Office in May 2019 was incorporated in the 2019 cost above.

Table 7 Miscellaneous Revenue

TABLE 7
New York City Water Board
Cost of Supplying Water to Upstate Customers
Miscellaneous Revenue
All Amounts in $

Year	Hydropower	Rents (Permits)	Tax Refunds	Total
2006	1,321,881	2,379,307	0	3,701,188
2007	4,987,041	2,300,515	0	7,287,556
2008	7,239,859	995,209	0	8,235,068
2009	6,086,074	1,800,000	248,145	8,134,219
2010	5,117,222	1,855,183	0	6,972,405
2011	8,299,784	1,568,273	0	9,868,057
2012	4,388,471	2,021,826	0	6,410,297
2013	5,540,899	3,420,571	209,232	9,170,702
2014	10,466,857	1,811,900	0	12,278,757
2015	6,307,979	1,831,585	0	8,139,564
2016	4,981,644	2,438,929	0	7,420,573
2017	4,882,340	2,533,196	0	7,415,536
2018	6,230,775	1,846,973	0	8,077,748
2019	5,985,477	2,514,131	0	8,499,608
2020	3,347,208	1,550,569	0	4,897,777
Average (2006-2020)		2,057,878		
Projection Years (2021-2025)				
2021	3,414,153	2,057,878	0	5,472,030
2022	3,482,436	2,057,878	0	5,540,313
2023	1,776,042	2,057,878	0	3,833,920
2024	3,623,126	2,057,878	0	5,681,004
2025	3,695,589	2,057,878	0	5,753,466

Notes:

(1) Certain historical revenues for hydropower and rents have changed from prior reports based on updated information from the City.

(2) FY 2015 hydropower revenue is shown net of expenses. Hydropower revenue in other years and projected hydropower revenue for FY 2021 - FY 2025 excludes expenses which are included in Tables 4A and 4B for those years.

Table 8A Historical Upstate Direct Personal Services Costs

TABLE 8A
New York City Water Board
Historical Cost of Supplying Water to Upstate Customers
Upstate New York Field Personnel Costs

Line No.	Description	FY 2018 $	FY 2019 $	FY 2020 $
	Divisional and Sectional Offices			
1	Katonah Resource Protection	459,489	668,369	595,116
2	Carmel Section	3,586,663	3,697,766	4,181,725
3	Prattsville/Schoharie	2,364,401	2,424,261	2,413,223
4	Ashokan	5,610,535	5,662,574	6,419,125
5	Grahamsville	6,805,407	6,909,284	7,479,748
6	Port Jervis	721,838	746,824	771,767
7	E. Division Hudson River P/S	2,389,184	2,275,712	2,136,898
	Laboratories			
8	Hawthorne (1)	3,311,996	3,164,235	3,231,367
9	Grahamsville	1,401,597	1,320,263	1,459,155
	Other Services			
10	Downsville	3,868,856	4,020,623	4,128,212
11	Sutton Park (2)	8,588,557	8,962,475	9,106,554
12	Kingston	11,724,247	12,108,146	12,317,904
13	Watershed Security (3)	22,794,225	23,780,064	23,865,379
14	Watershed-East of Hudson	4,459,706	5,144,436	5,609,682
15	Downsville/Water Plan and Protect	265,906	286,468	308,642
16	Mahopac	2,300,846	2,178,961	2,121,852
17	IT (4)	150,331	153,609	157,778
18	Hillview Reservoir (5)	6,934,670	7,449,109	7,287,898
19	UV Facility	5,115,014	4,660,786	5,358,290
20	Direct Personnel Overtime Costs	4,236,298	4,109,839	4,750,664
21	**Total Personal Services Costs**	**97,089,768**	**99,723,805**	**103,700,980**

Notes:
(1) Beginning in FY 2016, the Kensico and Brewster labs were combined and renamed as Hawthorne Lab
(2) Sutton Park expenses include costs for laboratories.
(3) Hillview, Croton, Ashokan, Schoharie, Kingston, Downsville, Neversink, Beerston & other watershed locations.
(4) The employees in the OIT/ BWS group are a part of the Bureau of Water Supply, located north of the City. In prior years, the group was included in personnel service costs for Water Supply but within the City.
(5) Hillview Reservoir costs include overtime expenses, which are not included in Line 20.
(6) Personal service costs include salary, wages and a fringe benefit rate of: 50.11% in FY 2018, 47.91% in FY 2019, and 48.01% in FY 2020.
(7) Upward or downward changes from year to year in a particular category of costs may reflect shifts in classifications for accounting purposes as opposed to changes in personnel functions or responsibilities.

Table 8B Projected Upstate Direct Personal Services Costs

TABLE 8B
New York City Water Board
Cost of Supplying Water to Upstate Customers
Upstate New York Field Personnel Costs

Line No.	Description	*Projected Years* FY 2021 $	FY 2022 $	FY 2023 $	FY 2024 $	FY 2025 $
	Divisional and Sectional Offices					
1	Katonah Resource Protection	611,023	629,353	648,234	667,681	687,712
2	Carmel Section	4,293,499	4,422,304	4,554,973	4,691,622	4,832,371
3	Prattsville/Schoharie	2,477,726	2,552,058	2,628,620	2,707,479	2,788,703
4	Ashokan	6,590,704	6,788,425	6,992,078	7,201,840	7,417,895
5	Grahamsville	7,679,676	7,910,066	8,147,368	8,391,789	8,643,543
6	Port Jervis	792,395	816,167	840,652	865,872	891,848
7	E. Division Hudson River P/S	2,194,015	2,259,836	2,327,631	2,397,460	2,469,384
	Laboratories					
8	Hawthorne (1)	3,317,740	3,417,272	3,519,790	3,625,384	3,734,145
9	Grahamsville	1,498,157	1,543,102	1,589,395	1,637,077	1,686,189
	Other Services					
10	Downsville	4,238,556	4,365,713	4,496,684	4,631,585	4,770,532
11	Sutton Park (2)	9,349,966	9,630,465	9,919,379	10,216,960	10,523,469
12	Kingston	12,647,153	13,026,568	13,417,365	13,819,886	14,234,482
13	Watershed Security (3)	24,503,283	25,238,382	25,995,533	26,775,399	27,578,661
14	Watershed-East of Hudson	5,759,624	5,932,413	6,110,385	6,293,697	6,482,508
15	Downsville/Water Plan and Protect	316,892	326,399	336,191	346,276	356,665
16	Mahopac	2,178,568	2,243,925	2,311,243	2,380,580	2,451,997
17	IT (4)	161,995	166,855	171,861	177,017	182,327
18	Hillview Reservoir (5)	7,482,698	7,707,179	7,938,395	8,176,546	8,421,843
19	UV Facility	5,501,513	5,666,559	5,836,555	6,011,652	6,192,002
20	Direct Personnel Overtime Costs	4,877,646	5,023,975	5,174,695	5,329,936	5,489,834
21	**Total Personal Services Costs**	**106,472,832**	**109,667,017**	**112,957,027**	**116,345,738**	**119,836,110**

Notes:
(1) Beginning in FY 2016, the Kensico and Brewster labs were combined and renamed as Hawthorne Lab
(2) Sutton Park expenses include costs for laboratories.
(3) Hillview, Croton, Ashokan, Schoharie, Kingston, Downsville, Neversink, Beerston & other watershed locations.
(4) The employees in the OIT/ BWS group are a part of the Bureau of Water Supply, located north of the City. In prior years, the group was included in personnel service costs for Water Supply but within the City.
(5) Hillview Reservoir costs include overtime expenses, which are not included in Line 20.
(6) Personal service costs include an assumed fringe benefit rate of 47.54% in FY 2021- FY 2025.
(7) It is assumed that personal services costs will increase 3.0% per year in FY 2021 - FY 2025, exclusive of changes in the fringe benefit rate
(8) Upward or downward changes from year to year in a particular category of costs may reflect shifts in classifications for accounting purposes as opposed to changes in personal functions or responsibilities.

Table 9A Historical Upstate Indirect Personal Services Costs

TABLE 9A
New York City Water Board
Historical Cost of Supplying Water to Upstate Customers
Upstate New York Support & Administrative Personnel Costs

Line No.	Description	FY 2018 $	FY 2019 $	FY 2020 $
	Divisional and Sectional Offices			
1	Katonah Resource Protection	415,032	470,720	576,898
2	Carmel Section	100,317	78,938	43,317
3	Ashokan	258,772	247,530	280,718
4	Grahamsville	2,380,239	2,821,133	2,855,748
5	E. Division Hudson River P/S	187,107	190,641	196,894
	Laboratories			
6	Hawthorne (1)	793,641	705,609	762,082
7	Grahamsville	331,429	192,953	153,786
	Other Services			
8	Downsville	308,411	308,488	344,814
9	Sutton Park (2)	6,397,648	7,709,801	7,937,592
10	Kingston Office	6,892,334	7,298,310	7,619,595
11	Watershed Security (3)	1,943,881	2,187,653	2,038,008
12	East of Hudson Fleet	291,788	306,557	308,613
13	Shokan Fleet Admin.	413,494	486,949	540,672
14	Downsville Fleet Admin.	127,456	126,719	135,009
15	Grahmsville Fleet Admin.	397,084	381,797	404,811
16	Watershed-East of Hudson	0	0	0
17	IT (4)	1,643,252	1,769,257	1,865,898
18	Other	5,464	11,182	0
19	UV Facility	835,681	711,948	749,535
20	Indirect Personnel Overtime Costs	469,010	409,326	405,460
21	**Total Personal Services Costs**	**24,192,038**	**26,415,510**	**27,219,451**

Notes:
(1) Beginning in FY 2016, the Kensico and Brewster labs were combined and renamed as Hawthorne Lab
(2) Sutton Park expenses include costs for laboratories.
(3) Hillview, Croton, Ashokan, Schoharie, Kingston, Downsville, Neversink, Beerston & other watershed locations.
(4) The employees in the OIT/ BWS group are a part of the Bureau of Water Supply, located north of the City. In prior years, the group was included in personnel service costs for Water Supply but within the City.
(5) Personal service costs include salary, wages and a fringe benefit rate of: 50.11% in FY 2018, 47.91% in FY 2019, and 48.01% in FY 2020.
(6) Upward or downward changes from year to year in a particular category of costs may reflect shifts in classifications for accounting purposes as opposed to changes in personal functions or responsibilities.

Table 9B Projected Upstate Indirect Personal Services Costs

TABLE 9B
New York City Water Board
Cost of Supplying Water to Upstate Customers
Upstate New York Support & Administrative Personnel Costs

Line No.	Description	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
		Projected Years				
		$	$	$	$	$
	Divisional and Sectional Offices					
1	Katonah Resource Protection	592,318	610,088	628,391	647,242	666,660
2	Carmel Section	44,475	45,809	47,183	48,599	50,057
3	Ashokan	288,222	296,868	305,774	314,948	324,396
4	Grahamsville	2,932,080	3,020,043	3,110,644	3,203,963	3,300,082
5	E. Division Hudson River P/S	202,157	208,222	214,468	220,902	227,530
	Laboratories					
6	Hawthorne (1)	782,452	805,925	830,103	855,006	880,656
7	Grahamsville	157,896	162,633	167,512	172,538	177,714
	Other Services					
8	Downsville	354,030	364,651	375,591	386,858	398,464
9	Sutton Park (2)	8,149,758	8,394,251	8,646,078	8,905,461	9,172,625
10	Kingston Office	7,823,261	8,057,959	8,299,698	8,548,689	8,805,149
11	Watershed Security (3)	2,092,482	2,155,257	2,219,914	2,286,512	2,355,107
12	East of Hudson Fleet	316,862	326,368	336,159	346,244	356,631
13	Ashokan Fleet Admin.	555,124	571,778	588,931	606,599	624,797
14	Downsville Fleet Admin.	138,618	142,776	147,059	151,471	156,015
15	Grahmsville Fleet Admin.	415,631	428,100	440,943	454,172	467,797
16	Watershed-East of Hudson	0	0	0	0	0
17	IT (4)	1,915,772	1,973,245	2,032,443	2,093,416	2,156,218
18	Other	0	0	0	0	0
19	UV Facility	769,570	792,657	816,437	840,930	866,158
20	Indirect Personnel Overtime Costs	416,298	428,787	441,650	454,900	468,547
21	**Total Personal Services Costs**	**27,947,007**	**28,785,417**	**29,648,979**	**30,538,449**	**31,454,602**

Notes:

(1) Beginning in FY 2016, the Kensico and Brewster labs were combined and renamed as Hawthorne Lab
(2) Sutton Park expenses include costs for laboratories.
(3) Hillview, Croton, Ashokan, Schoharie, Kingston, Downsville, Neversink, Beerston & other watershed locations.
(4) The employees in the OIT/ BWS group are a part of the Bureau of Water Supply, located north of the City. In prior years, the group was included in personnel service costs for Water Supply but within the City.
(5) Personal service costs include an assumed fringe benefit rate of 47.54% in FY 2021- FY 2025.
(6) It is assumed that personal services costs will increase 3.0% per year in FY 2021 - FY 2025, exclusive of changes in the fringe benefit rate.
(7) Upward or downward changes from year to year in a particular category of costs may reflect shifts in classifications for accounting purposes as opposed to changes in personal functions or responsibilities.

Table 10 Development of Allocation Factors

TABLE 10
New York City Water Board
Cost of Supplying Water to Upstate Customers
Development of Allocation Factors

Line No.	Description	2017		2018		2019		2020		Projection Years
1	Total Salaries - Employees North of the City	105,062,405		109,641,828		114,171,041		118,565,678		
2		---------- =	57.23%	---------- =	56.95%	---------- =	57.23%	---------- =	57.50%	57.50%
3	Total Salaries - All Water Supply Employees	183,570,788		192,514,956		199,499,415		206,191,105		
4	Total Salaries - Employees North of the City	105,062,405		109,641,828		114,171,041		118,565,678		
5		---------- =	17.60%	---------- =	17.24%	---------- =	17.02%	---------- =	16.74%	16.74%
6	Total Salaries - All NYC DEP Employees	596,866,547		636,153,473		670,858,204		708,459,553		

(1) The Total Salaries exclude salaries, wages and fringe benefits for personnel assigned to Hurricane Sandy and Grant Programs.
(2) The Total Salaries - Employees North of the City on Line 1 excludes salaries for employees at the Hillview facility. The Water Board may, at its discretion, add such costs to Line 1.

Table 11A Historical Allocation of DEP Personal Services Costs

TABLE 11A
New York City Water Board
Cost of Supplying Water to Upstate Customers
Historical Allocation of DEP Personal Services
Costs to Facilities North of the City

Line No.	Description	FY 2018 $	FY 2019 $	FY 2020 $
1	Executive	9,273,742	10,235,446	11,346,984
2	General Counsel	5,983,708	5,617,026	6,106,069
3	Communications	2,577,317	2,734,859	2,779,905
4	Env. Health & Safety	4,086,009	4,413,214	4,354,398
5	Environ. Planning	6,334,680	7,200,026	8,228,960
6	Budget Office	3,480,251	3,522,670	3,716,164
7	Facilities Mgt & Constr	7,094,520	6,820,719	7,828,274
8	Human Res & Labor Rel	10,969,212	12,083,005	12,937,610
9	Chief Contract Office	3,653,462	4,447,519	4,521,795
10	Addt'l Exec & Support	2,168,467	2,244,846	2,963,763
11	Total DEP Executive and Support Personal Services Costs	55,621,367	59,319,329	64,783,922
12	Allocation to Water Supply North of NYC (1)	17.24%	17.02%	16.74%
13	**Personal Services Costs Related to Facilities North of the City**	**9,586,411**	**10,095,352**	**10,842,044**

Notes:
(1) From Table 10.
(2) Personal service costs include salary, wages and a fringe benefit rate of: 50.11% in FY 2018, 47.91% in FY 2019, and 48.01% in FY 2020.

Table 11B Projected Allocation of DEP Personal Services Costs

TABLE 11B
New York City Water Board
Cost of Supplying Water to Upstate Customers
Projected Allocation of DEP Personal Services
Costs to Facilities North of the City

Line No.	Description	*Projected Years* FY 2021 $	FY 2022 $	FY 2023 $	FY 2024 $	FY 2025 $
1	Executive	11,650,281	11,999,789	12,359,783	12,730,577	13,112,494
2	General Counsel	6,269,280	6,457,358	6,651,079	6,850,611	7,056,129
3	Public Affairs	2,854,210	2,939,836	3,028,031	3,118,872	3,212,438
4	Env. Health & Safety	4,470,788	4,604,911	4,743,059	4,885,350	5,031,911
5	Environ. Planning	8,448,914	8,702,381	8,963,453	9,232,356	9,509,327
6	Budget Office	3,815,495	3,929,959	4,047,858	4,169,294	4,294,373
7	Facilities Mgt & Constr	8,037,518	8,278,644	8,527,003	8,782,813	9,046,298
8	Human Res & Labor Rel	13,283,423	13,681,926	14,092,383	14,515,155	14,950,610
9	Chief Contract Office	4,642,659	4,781,939	4,925,397	5,073,159	5,225,354
10	Addt'l Exec & Support	3,042,983	3,134,272	3,228,300	3,325,149	3,424,904
11	Total DEP Personal Services Costs	66,515,549	68,511,016	70,566,346	72,683,337	74,863,837
12	Allocation to Water Supply North of NYC (1)	16.74%	16.74%	16.74%	16.74%	16.74%
13	**Personal Services Costs - Facilities North of the City**	**11,131,844**	**11,465,799**	**11,809,773**	**12,164,067**	**12,528,988**

Notes:

(1) From Table 10, Projection Years.

(2) Personal service costs include a fringe benefit rate of 47.54% in FY 2021 - FY 2025.

(3) It is assumed that personal services costs will increase 3.0% per year in FY 2021 - FY 2025, exclusive of changes in the fringe benefit rate.

(4) Upward or downward changes from year to year in a particular category of costs may reflect shifts in classifications for accounting purposes as opposed to changes in personal functions or responsibilities.

Table 12A Historical Allocation of DEP Other Than Personal Services Costs

TABLE 12A
New York City Water Board
Historical Cost of Supplying Water to Upstate Customers
Allocation of DEP Other Than Personal Services
Costs to Facilities North of the City

Line No.	Description	FY 2018 $	FY 2019 $	FY 2020 $
1	Agency Chief Contracting Officer (ACCO)/Accounting	74,874	85,075	68,392
2	Executive and Support	47,122	59,804	26,780
3	Fleet Administration	7,949,020	8,452,581	7,009,803
4	Public Affairs & Intergovernmental	248,068	433,646	368,391
5	Facilities Management and Construction	778,283	1,138,232	647,236
6	Management and Budget	3,622,221	3,402,886	3,087,605
7	Management Information Systems	14,805,019	15,344,286	14,041,180
8	Chief Engineer, 1st Deputy & Engineering Audit	690,288	19,555	7,629
9	Legal & Legislative	81,207	85,790	74,776
10	Environmental Assessment	2,702,413	3,442,578	1,672,827
11	Telephone	6,793,817	6,800,005	6,152,300
12	Lefrak Administration Rents	5,467,595	5,792,396	5,866,756
13	Facility Management Rents	532,782	508,242	511,745
14	Management and Budget Environmental Health/Safety	328,303	284,462	237,927
15	Security Services	1,698,157	1,860,582	1,791,933
16	DEP Online Store	(5,689)	(1,567)	7,280
17	PC Purchasing Consolidation Administration	153,824	148,490	149,340
18	LeFrak Carpet Installation (1)	0	46,068	15,785
19	Coronavirus	0	0	120,523
20	BEPA Rezoning Planning Support	0	0	1,244,463
21	BEPA Integrated Water Mgnt Planning	0	0	570,620
22	Total OTPS to be Allocated	45,967,304	47,903,111	43,673,288
23	Allocation (2)	17.24%	17.02%	16.74%
24	OTPS Allocation (line 22 X line 23)	7,922,521	8,152,465	7,309,031
25	Rents Other Than Lefrak	3,013,453	3,048,895	3,191,152
26	Lefrak Water Supply Rents	1,673,035	1,472,942	1,683,488
27	Total Rents (line 25 + line 26)	4,686,489	4,521,837	4,874,640
28	Motor Vehicle Parking	442,438	591,263	591,263
29	Allocation in Each Year	26.46%	24.22%	24.16%
30	Total Motor Vehicle Parking (line 28 X line 29)	117,051	143,201	142,872
31	Rent & Motor Vehicles Costs Allocated to Water Supply at DEP (3)	4,803,540	4,665,038	5,017,512
32	Allocation to Facilities North of NYC (2)	56.95%	57.23%	57.50%
33	OTPS Costs Related to Facilities North of the City			
33	Rent & Motor Vehicles Costs Related to Facilities North of the City (4)	2,735,730	2,669,744	2,885,210
34	**OTPS Costs Related to Facilities North of the City (5)**	**10,658,251**	**10,822,209**	**10,194,242**

Notes:
(1) LeFrak carpet installation costs are reimbursed.
(2) From Table 10.
(3) Rent & motor vehicles costs allocated to Water Supply are equal to the sum of lines 27 and 30.
(4) Rent & motor vehicles costs allocated to north of the City are equal to line 31 X line 32.
(5) OTPS costs related to facilities north of the City are equal to sum of lines 24 and 33.

Table 12B Projected Allocation of DEP Other Than Personal Services Costs

TABLE 12B
New York City Water Board
Cost of Supplying Water to Upstate Customers
Allocation of DEP Other Than Personal Services
Costs to Facilities North of the City

Line No.	Description	*Projected Years* FY 2021 $	FY 2022 $	FY 2023 $	FY 2024 $	FY 2025 $
1	Agency Chief Contracting Officer (ACCO)/Accounting	70,444	72,557	74,734	76,976	79,285
2	Executive and Support	27,583	28,411	29,263	30,141	31,045
3	Fleet Administration	7,220,098	7,436,700	7,659,801	7,889,596	8,126,283
4	Public Affairs & Intergovernmental	379,443	390,826	402,551	414,627	427,066
5	Facilities Management and Construction	666,653	686,652	707,252	728,470	750,324
6	Management and Budget	3,180,233	3,275,640	3,373,909	3,475,126	3,579,380
7	Management Information Systems	14,462,415	14,896,288	15,343,176	15,803,471	16,277,576
8	Chief Engineer, 1st Deputy & Engineering Audit	7,857	8,093	8,336	8,586	8,844
9	Legal	77,019	79,329	81,709	84,161	86,685
10	Environmental Assessment	1,723,012	1,774,702	1,827,943	1,882,781	1,939,265
11	Telephone	6,336,869	6,526,975	6,722,784	6,924,468	7,132,202
12	Lefrak Administration Rents	6,042,759	6,224,042	6,410,763	6,603,086	6,801,178
13	Facility Management Rents	527,097	542,910	559,198	575,974	593,253
14	Management and Budget Environmental Health/Safety	245,064	252,416	259,989	267,789	275,822
15	Security Services	1,845,691	1,901,061	1,958,093	2,016,836	2,077,341
16	DEP Online Store	0	0	0	0	0
17	PC Purchasing Consolidation Administration	153,820	158,435	163,188	168,083	173,126
18	LeFrak Carpet Installation	0	0	0	0	0
19	Coronavirus	124,139	127,863	131,699	135,650	139,719
20	BEPA Rezoning Planning Support	1,281,797	1,320,251	1,359,858	1,400,654	1,442,674
21	BEPA Integrated Water Mgnt Planning	587,738	605,370	623,532	642,237	661,505
22	Total OTPS to be Allocated	44,959,730	46,308,522	47,697,778	49,128,711	50,602,573
23	Allocation (1)	16.74%	16.74%	16.74%	16.74%	16.74%
24	OTPS Allocation (line 22 X line 23)	7,524,326	7,750,056	7,982,558	8,222,035	8,468,696
25	Rents Other Than Lefrak	3,286,887	3,385,493	3,487,058	3,591,670	3,699,420
26	Lefrak Water Supply Rents	1,733,992	1,786,012	1,839,593	1,894,780	1,951,624
27	Total Rents (line 25 + line 26)	5,020,879	5,171,506	5,326,651	5,486,450	5,651,044
28	Motor Vehicle Parking	609,001	627,271	646,089	665,472	685,436
29	Allocation	24.16%	24.16%	24.16%	24.16%	24.16%
30	Total Motor Vehicle Parking (line 28 X line 29)	147,158	151,573	156,120	160,804	165,628
31	Rent & Motor Vehicles Costs Allocated to Water Supply at DEP (2)	5,168,037	5,323,078	5,482,771	5,647,254	5,816,671
32	Allocation to Facilities North of NYC (1)	57.50%	57.50%	57.50%	57.50%	57.50%
33	Rent & Motor Vehicles Costs Related to Facilities North of the City (3)	2,971,767	3,060,920	3,152,747	3,247,330	3,344,750
34	**OTPS Costs Related to Facilities North of the City (4)**	**10,496,093**	**10,810,976**	**11,135,305**	**11,469,364**	**11,813,445**

Notes:
(1) From Table 10, Projection Years.
(2) Rent & motor vehicles costs allocated to Water Supply are equal to the sum of lines 27 and 30.
(3) Rent & motor vehicles costs allocated to north of the City are equal to line 31 X line 32.
(4) OTPS costs related to facilities north of the City are equal to sum of lines 24 and 33.
(5) It is assumed that OTPS costs, other than Lefrak carpet installation and the DEP Online Store, will increase at the rate of 3% per annum.

Table 13 Annual Water Consumption

TABLE 13
New York City Water Board
Cost of Supplying Water to Upstate Customers
Annual Water Consumption

Line No.	Fiscal Year	(A) System-Wide Consumption mg	(B) Upstate Consumption mg	Upstate as a % of Total [B]/[A]
1	1985	544,025	41,661	7.66%
2	1986	501,019	39,397	7.86%
3	1987	542,870	42,853	7.89%
4	1988	573,679	44,956	7.84%
5	1989	559,669	43,255	7.73%
6	1990	547,522	42,795	7.82%
7	1991	564,234	45,103	7.99%
8	1992	560,014	44,010	7.86%
9	1993	531,796	42,015	7.90%
10	1994	538,558	43,221	8.03%
11	1995	520,410	43,915	8.44%
12	1996	528,938	45,125	8.53%
13	1997	487,012	44,044	9.04%
14	1998	483,182	44,404	9.19%
15	1999	499,849	47,230	9.45%
16	2000	502,758	46,922	9.33%
17	2001	488,909	45,845	9.38%
18	2002	467,705	45,200	9.66%
19	2003	449,606	43,400	9.65%
20	2004	446,822	43,198	9.67%
21	2005	443,445	43,072	9.71%
22	2006	441,477	44,504	10.08%
23	2007	444,553	43,895	9.87%
24	2008	452,048	43,559	9.64%
25	2009	420,438	41,477	9.87%
26	2010	411,482	40,797	9.91%
27	2011	420,635	42,682	10.15%
28	2012	408,954	39,713	9.71%
29	2013	410,006	40,143	9.79%
30	2014	407,436	40,485	9.94%
31	2015	406,815	40,745	10.02%
32	2016	405,876	40,878	10.07%
33	2017	405,883	41,342	10.19%
34	2018	406,551	40,129	9.87%
35	2019	398,171	36,477	9.16%
36	2020	395,602	37,647	9.52%
Projections:				
37	2021	393,938	35,896	9.11%
38	2022	391,112	34,764	8.89%
39	2023	388,286	33,631	8.66%
40	2024	385,460	32,498	8.43%
41	2025	382,634	31,365	8.20%

Notes:

(1) Consumption projections are based on a 5-year regression analysis.

(2) Equation used to calculate System-wide Consumption:
y=m(t)+b. Where (t) is a given year.
m= -2826.068244
b= 6,105,422.20

(3) Equation used to calculate Upstate Consumption:
y=m(t)+b. Where (t) is a given year.
m= -1,132.73
b= 2,325,140.04

Table 14 Projected Revenues From Hydroelectric Facilities

Table 14

NYC Department of Environmental Protection
Gross Revenue Estimates for Upstate Hydro-Electric Facilities
All Amounts in $

Revenues	Fiscal Year 2021	2022	2023	2024	2025
Neversink	1,120,142	1,142,545	582,698	1,188,703	1,212,477
West Delaware	24,971	25,471	12,990	26,500	27,030
East Delaware	2,269,039	2,314,420	1,180,354	2,407,923	2,456,081
Summary	3,414,153	3,482,436	1,776,042	3,623,126	3,695,589

Notes:

(1) All figures for Neversink and East Delaware are based on 2019 results reported by the New York City Office of the Comptroller, adjusted for inflation in subsequent years at the rate of 2% per year.

(2) Calendar year revenue data is used to estimate the fiscal year revenue when the fiscal year data is not available at the time of this Report.

(3) With the construction of the Rondout-West Branch bypass tunnel beginning in October 2022 for a period of up to eight months, hydropower revenues will be impacted in 2023. Accordingly, projected 2023 hydropower revenues have been discounted 50%.

Table 15 Comparison of Upstate Customer Billings vs. Cost of Service

TABLE 15
New York City Water Board
Cost of Supplying Water to Upstate Customers
Cost-of-Service Reconciliation

Fiscal Year	Rate ($) per Million Gallons (MG) Billed to Upstate Customers	Computed Cost to the Board	Upstate Consumption (MG)	Total Billed ($)	Actual Cost ($)	Underpayment ($)
1998	274.93	338.79	44,404	12,208,047	15,043,699	2,835,652
1999	342.97	348.31	47,230	16,198,439	16,450,646	252,208
2000	383.78	385.25	46,922	18,007,764	18,076,739	68,975
2001	414.37	414.88	45,845	18,996,834	19,020,215	23,381
2002	448.83	462.24	45,200	20,287,116	20,893,248	606,132
2003 (a)	485.71	522.99	43,400	21,079,814	22,697,766	1,617,952
2004 (a)	542.36	529.85	43,198	23,428,650	22,888,248	-540,402
2005	591.21	591.91	43,072	25,464,774	25,494,925	30,151
2006	617.79	623.47	44,504	27,494,064	27,746,847	252,782
2007	691.91	691.83	43,895	30,371,597	30,368,104	-3,493
2008	798.62	703.73	43,559	34,786,978	30,653,783	-4,133,195
2009	900.31	882.91	41,477	37,342,472	36,620,683	-721,789
2010	922.23	973.86	40,797	37,624,046	39,730,509	2,106,464
2011	1,149.72	1,121.04	42,682	49,072,562	47,848,489	-1,224,073
2012	1,213.84	1,283.45	39,713	48,205,540	50,970,046	2,764,506
2013	1,332.30	1,389.42	40,143	53,482,864	55,775,883	2,293,019
2014	1,496.76	1,604.43	40,485	60,596,628	64,955,593	4,358,965
2015	1,573.61	1,670.85	40,745	64,116,572	68,078,546	3,961,974
2016	1,728.99	1,769.49	40,878	70,677,331	72,332,828	1,655,497
2017	1,728.99	1,862.60	41,342	71,480,283	77,004,051	5,523,768
2018	1,728.99	1,846.08	40,129	69,381,804	74,080,477	4,698,673
2019	1,728.99	1,830.75	36,477	63,068,007	66,779,760	3,711,753
2020	1,888.06	1,838.52	37,647	71,079,580	69,214,390	-1,865,190
			Total Underpayment 1998-2020			28,273,710
			Total Underpayment 2011-2020			25,878,893

(a)The computed cost to the Board as shown above for 2003 and 2004 does not take into consideration the upstate share of the costs of defeasance of certain Authority bonds. Including the effects of the cost of defeasance, the rate per million gallons is $549.32 in 2003 and $560.58 in 2004.

(b)The rates shown above include the costs of defeasance, where applicable.

(c) The table above does not take into account the application of credits or charges to the cost of service based on prior year reconciliations.